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28 Tools for Team Management

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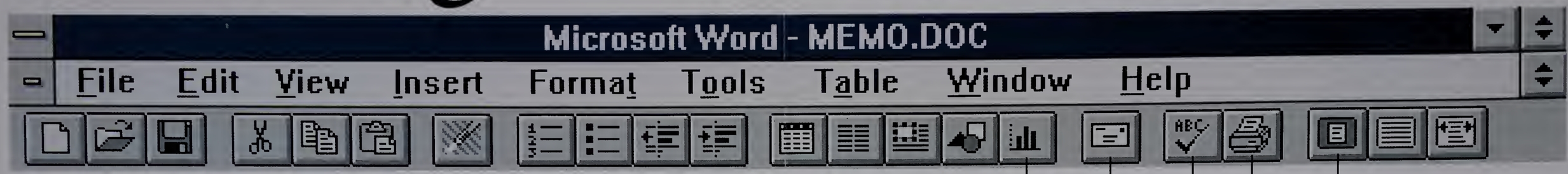

The Toolbar lets you do everyday things with the click of a button.

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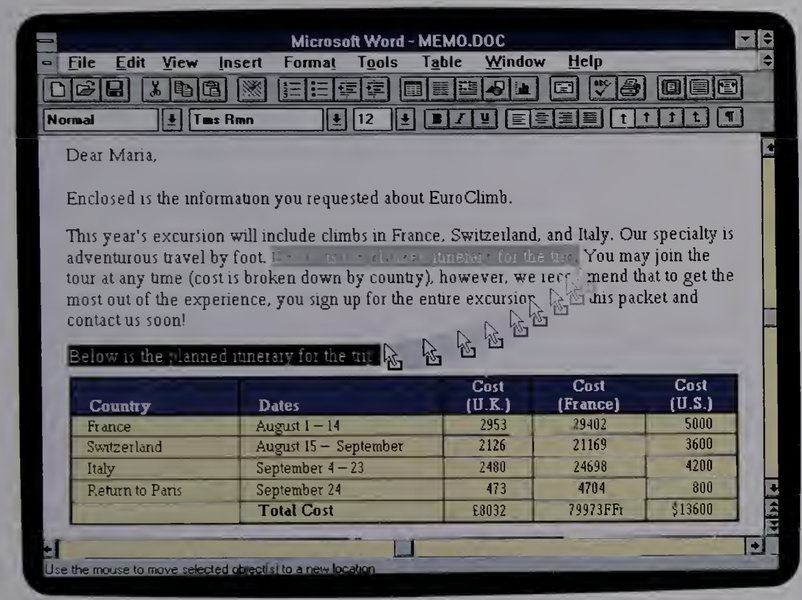
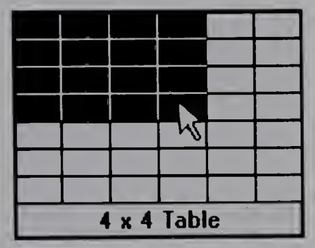
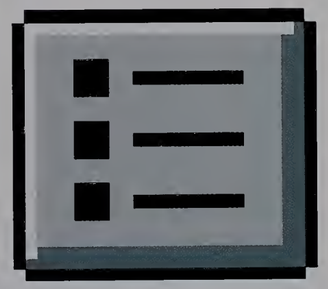


Rearranging a document couldn't be any easier. With new Word 2.0 you can drag and drop text wherever you want.

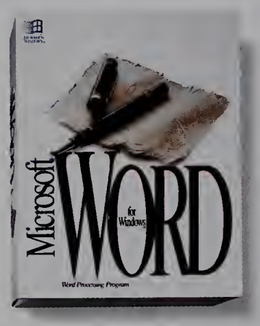


All it takes is one click on the Toolbar and presto, instant tables.



Click this Toolbar button and get instant bullets.

The mouse makes everyday tasks as easy as click, click, click.



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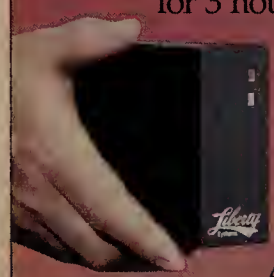

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PC World ™ (ISSN 0737-8939) is published monthly at $29.90 for one year (12 issues), $59.80 for two years (24 issues), $89.70 for three years (36 issues) by PC World Communications, Inc., 501 Second St. #600, San Francisco, CA 94107. Foreign orders must be prepaid in U.S. funds with additional postage. Add $18 per year for Canada and Mexico; add $46 per year for airmail for all other countries. Canadian GST Registration #R124669680. Second-class postage paid at San Francisco and additional mailing offices. POSTMASTER: Send address changes to *PC World,* Subscription Dept., P.O. Box 55029, Boulder, CO 80322-5029. Editorial and business offices: 501 Second St. #600, San Francisco, CA 94107, 415/243-0500; CompuServe 74055,412; MCI Mail PC World Editorial. *PC World* ™ is an independent journal, not affiliated in any way with International Business Machines Corporation. IBM is a registered trademark of International Business Machines Corp.

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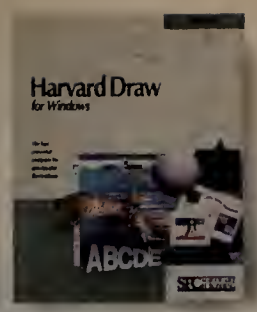

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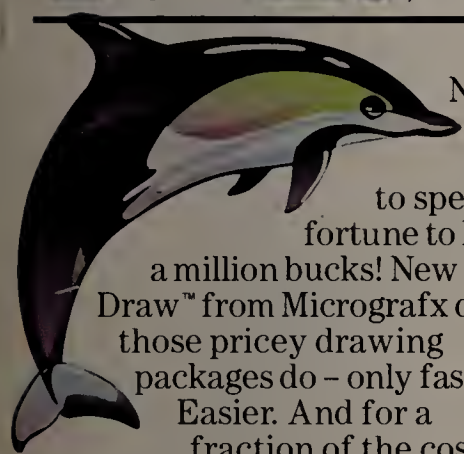

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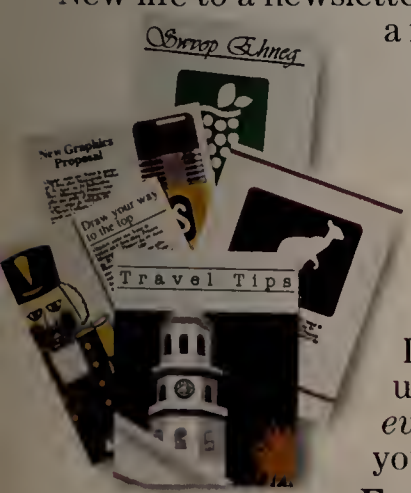

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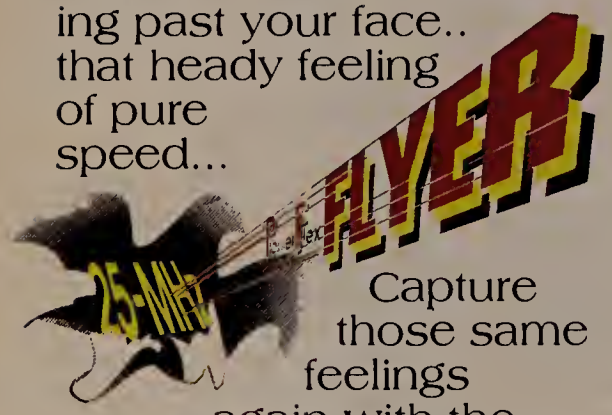

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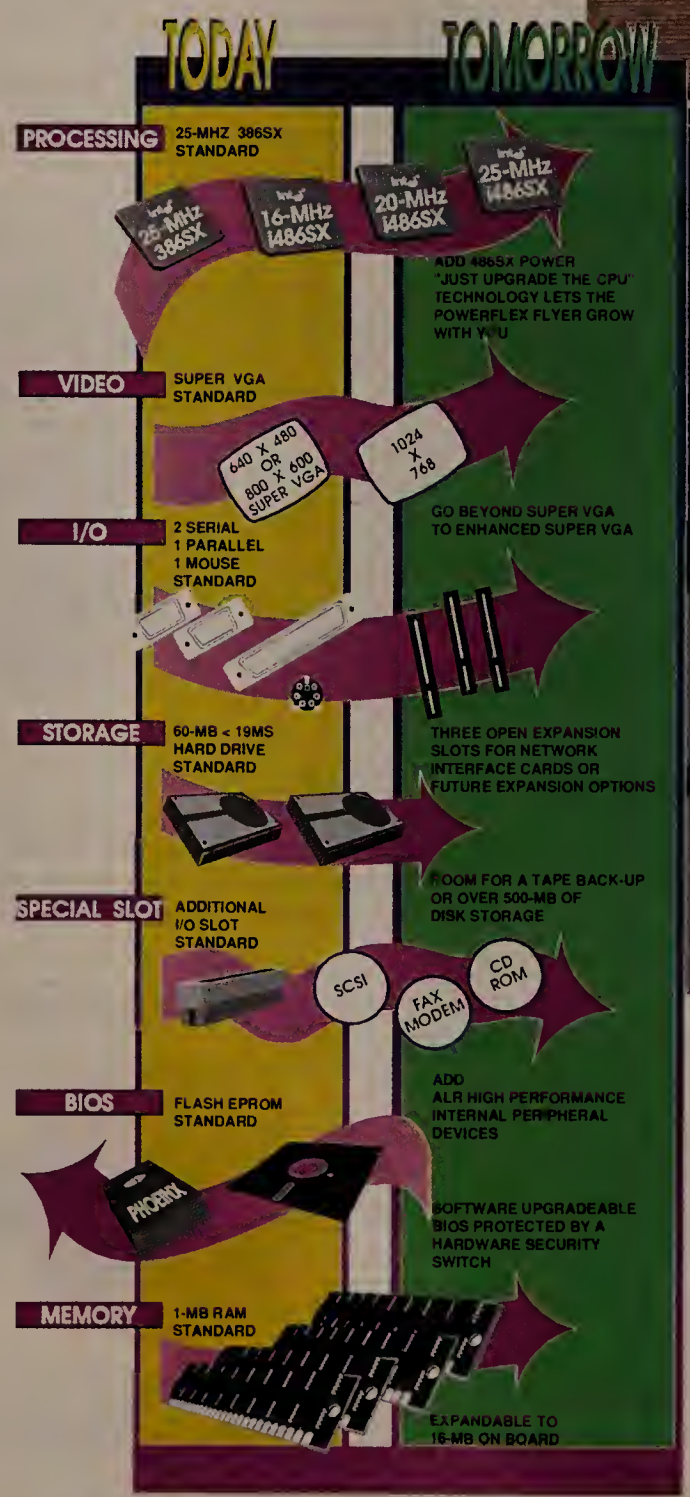

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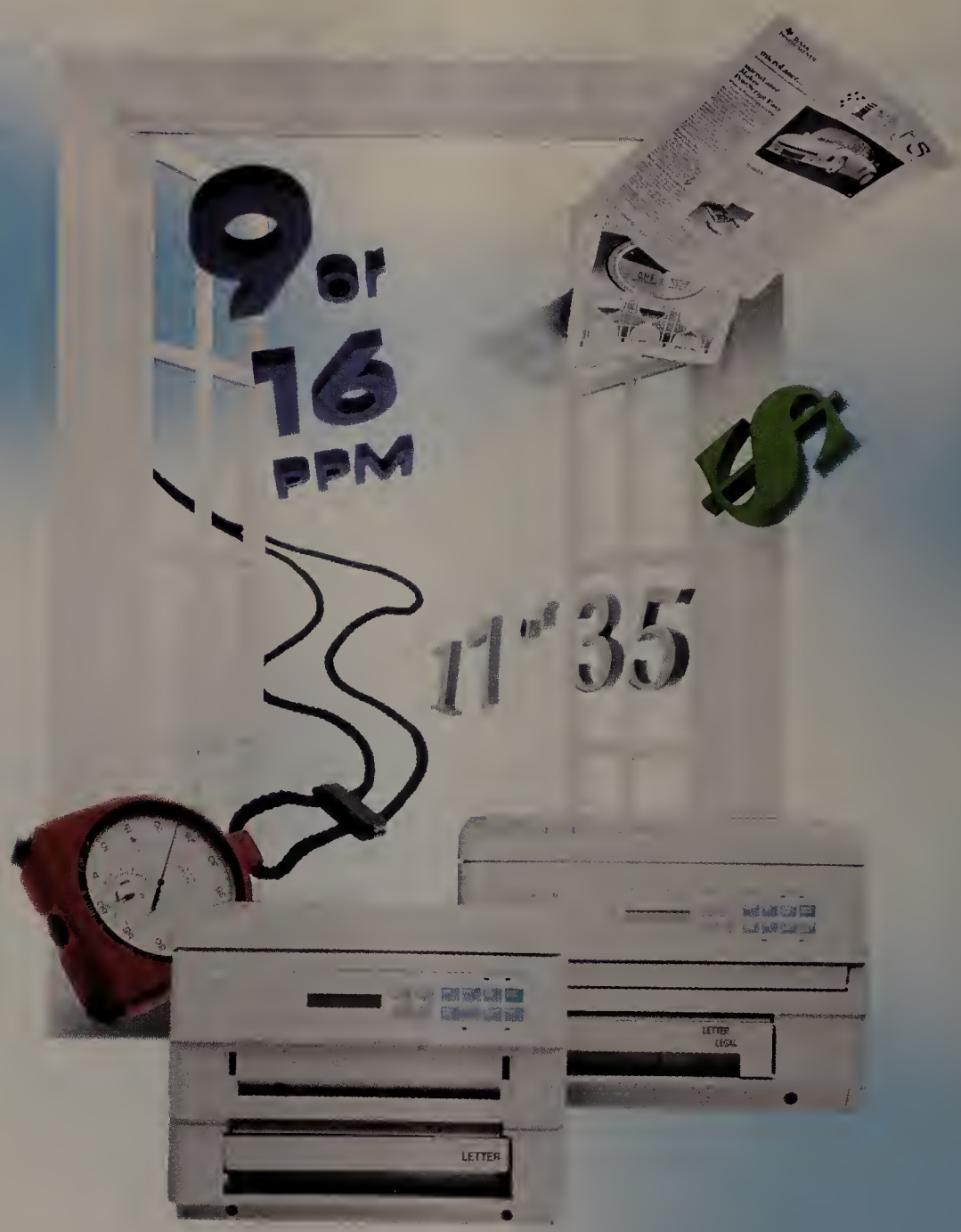

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The Spoils of War

Witnesses to a price war: Rex Farrance and Michael Goodwin

ROBERT CARDIN

Remember when they broke up Ma Bell's monopoly and suddenly you had to either return your telephone, lease it, or buy the thing for $50? Only a couple of years of free-market warfare later, and you could get a touch-tone phone as a "free gift" for the price of a magazine subscription.

The same market forces are now bearing on the CPU, the very engine of the PC. True, nobody's breaking up Intel, and the company never had a state-sanctioned monopoly on microprocessors. But it never had any serious competition either—until American Micro Devices began shipping 386-compatible chips. AMD's 40-MHz 386s blow past any Intel 386 and even outpace Intel's 20-MHz 486SX.

AMD's 386 challenge is already having its effect, as Rex Farrance and Michael Goodwin discovered when they put together this month's cover story. Intel has slashed prices on its 486SX chip, and as a result prices on 486SX systems continue to plummet. One example: Our Best Buy 486SX, the Eltech Model 4200, sells fully loaded for less than $2000; bare bones, you can pick one up for a mere $877.

That's not exactly giving them away, but as Senior Editor Mike Hogan notes in his column—debuting this month under the banner *What Next?*—the competition has just started. IBM, Chips and Technologies, and a number of other companies are (or soon will be) manufacturing 386-compatible microprocessors; by the time this magazine hits the newsstand, Hogan says, AMD will have already unleashed a 486 clone. More contenders means that CPU prices, and with them system prices, have only begun to fall.

To maintain its market share and profit margins, Intel must bring out next-generation products faster, a challenge the company (clearly more nimble and innovative than Ma Bell ever was) can certainly meet. Already Intel plans to release "clock doubler" chips that replace your existing 486SX CPU and provide close to a twofold increase in processing power.

Many systems in this month's cover story support Intel's clock doubler, and nearly half offer some other scheme to let you trade up to the latest and greatest processor in a flash. With such "modular" system architectures, CPUs are just another interchangeable part, like a disk drive or a graphics board. The duty cycle of upgradable systems can extend indefinitely, at least until upgrading a system becomes more expensive than buying a new one. And now that competing firms are making 386-compatible CPUs, new *types* of CPUs should emerge—386s that add enhancements for specific applications, in the same way the 486 includes a math coprocessor to speed spreadsheets and CAD programs.

If speed is what you're after, though, upgrading your CPU isn't the only way to get it. In this issue, TJ Byers's roundup of 22 fast video boards for *Windows* reveals that souping up video can, in some cases, give you a bigger speed boost than moving up to a faster CPU. And the competition is already fierce: One of the Best Buys in this review lists for a ridiculously low $149. Slip one of these boards into a new 486SX or 40-MHz 386, plug in a high-resolution display from this month's Buyers' Guide to super-VGA monitors, and you're well on your way to creating the perfect system for today's demanding applications.

Eric Knorr
Editor

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Morphology. It's the linguistic science of recognizing root words. It's also the science behind our breakthrough grammar checking technology that's a quantum leap in proofreading power for PCs—the writing improvement technology we call Mor•Proof.™ Introducing Grammatik™ 5 for DOS and Windows.

MOR•PROOF

THE POWER

New Grammatik 5 uses Mor•Proof (morphological proofreading) to analyze parts of speech using root words so it's not fooled by prefixes, suffixes, and conjunctions. It identifies nouns, verbs, and other parts of speech with unprecedented accuracy. And ferrets out even the most complex grammar errors with ease.

Subtle writing errors like tense shifts and incorrect verb forms are ripped out like weeds. Comma splices and conjunctive clause errors are clipped. Before they can cause you embarrassment.

Yet for all of its error detection prowess, Grammatik 5 is still as easy to use as a spelling checker.

THE PROOF

But precision proofreading is just the beginning. Virtually everything that's made Grammatik the #1 grammar and style checker is now even better.

Of course, it still proofreads your writing for errors in grammar, style, punctuation, usage, and spelling. But now, Grammatik checks 58 comprehensive classes of writing rules, protecting you against literally hundreds of thousands of possible errors. Including errors that even proofreading professionals often miss.

Grammatik 5 includes specific error-checking patterns for ten writing styles, from advertising and business letters to proposals and fiction. It works inside all major DOS and Windows word processors including Word, WordPerfect, and Ami Pro. And, it even has an instantly accessible writing guide with "Hot-Word" writing advice linked specifically to errors you've made.

THE PAYOFF

Which brings us to the payoff: Better writing.

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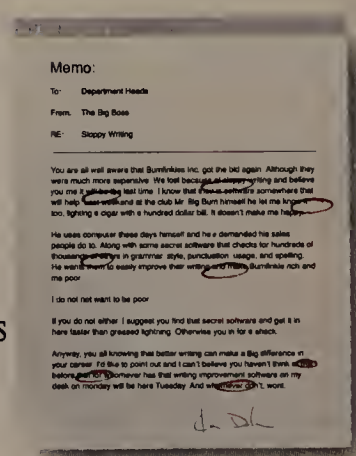
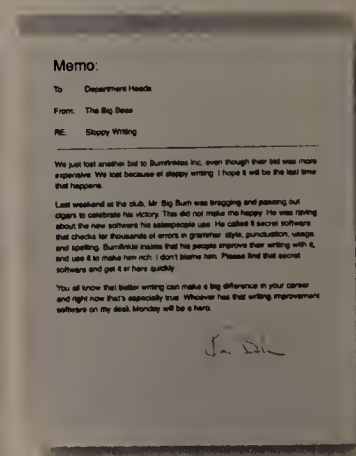
So rip those writing errors out by the roots with Grammatik 5. You'll discover what 1.5 million users already know. Grammatik is the easiest way to improve your writing.



BEFORE



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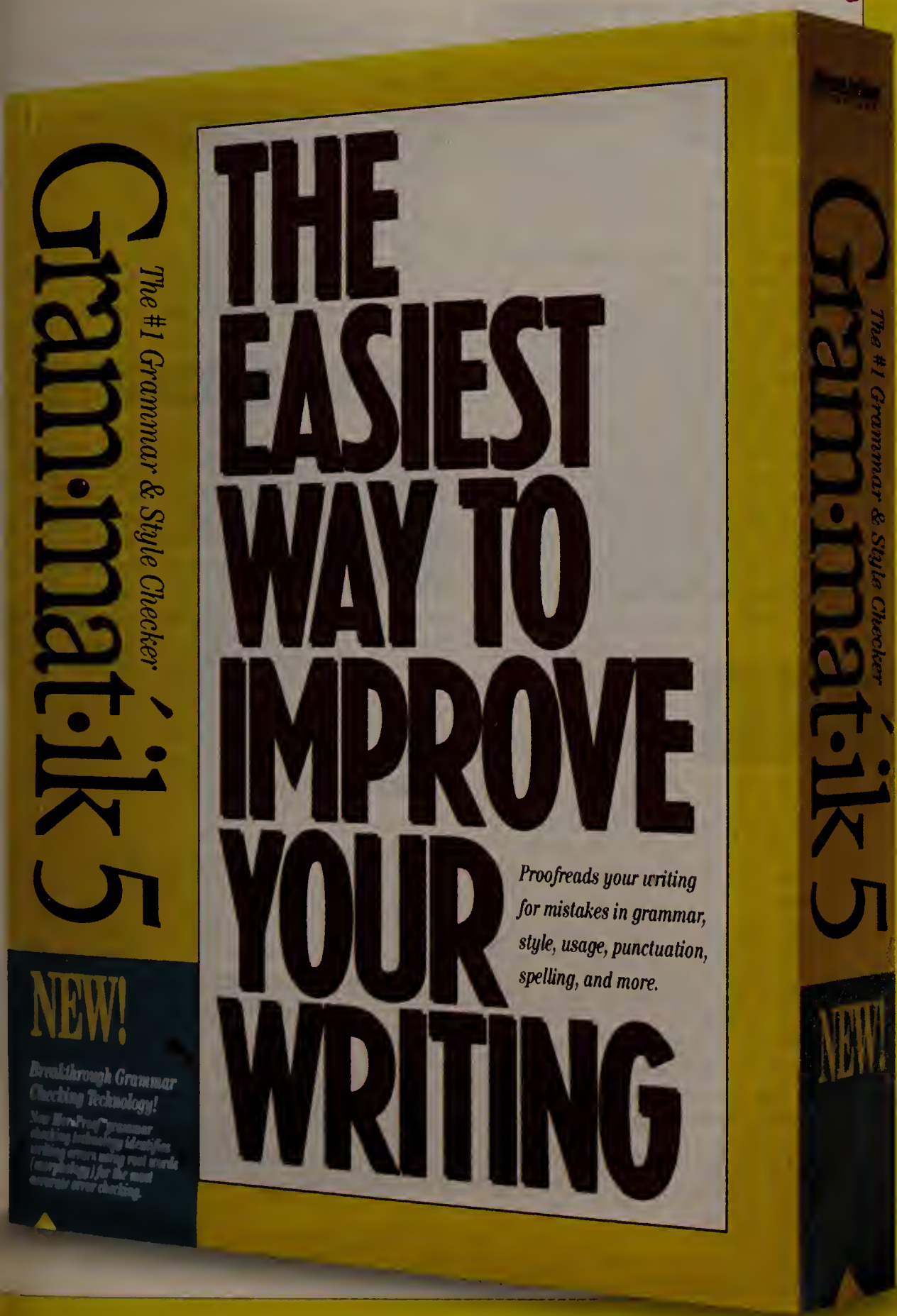

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Edited by RUSSELL GLITMAN

CPU Prices Fall as 386/486 Alternatives Proliferate

Intel to Cut 386 Prices 35 Percent

In an effort to slow the attack of the 386 clones, Intel president Andrew Grove has announced that his company will slash 386DX and 386SX prices dramatically—up to 35 percent—starting April 1. That could save buyers of 33-MHz 386-based PCs as much as $90 in this hotly competitive market, says Instat vice president Dean McCarron.

Exactly how much PC prices will drop also depends on other factors. PC vendors have little left to give on 386 prices, and PC sales seem to be picking up, trends that tend to firm prices. On the other hand, there's a myriad of 386 and 486 PCs available, so vendors may start discounting even before their lower cost inventory arrives from Intel.

Analysts said the Intel price cuts were triggered by Advanced Micro Devices' sale of more than $250 million worth of 386 CPU clones in 1991 and by the threat of added competition from Chips and Technologies, Cyrix, and others that are expected to join the fray this spring. Intel cut math coprocessor prices in half last summer in the face of similar competition.

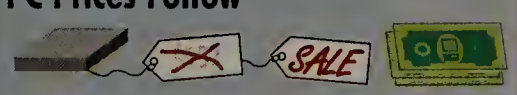
While lower 386 prices would tend to slow Intel's ability to move users onto 486-powered PCs, 486 prices will fall as well, says an Intel spokesperson, promising that "You'll see a $100 486SX [CPU] by year-end."

That would mean a 50 percent price reduction on Intel's cheapest 486, the 486SX/16, and a sea change in Intel's policy of reducing prices 20 percent each year. Intel contract prices fell 30 percent in 1991 and, reports McCarron, were generally abandoned in favor of still-lower street prices.

Intel plans to boost R&D and capital spending nearly a third to $2 billion in 1992, in an effort to counter the technological advances by clone makers. Users should see proof of that effort this summer, when Intel introduces its next-generation P-5 chip (sometimes called the 586).

—*Mike Hogan*

Processor Prices Plunge—PC Prices Follow



Chip/MHz	Old price	New price	Your savings
386SX/16	$56	$49	$10
386SX/20	$83	$59	$35
386DX/16, 20, 25	$152	$99	$65–$70
386DX/33	$190	$124	$80–$90

Sources: Instat, Intel

Intel's April 1 reduction of 386 prices is likely to shave still more off your PC's price.

Users Offered More 386/486 Choices

Intel finds itself in a footrace this spring with a rapidly expanding group of cloners determined to make a move on Intel's 386 and 486 CPUs and math coprocessor markets.

Intel hopes to counter threats from competitors like Advanced Micro Devices, which is about to launch alternatives to Intel's 486 processors. AMD's 486 line is said to include 486DX-class chips at 486SX prices. AMD may also offer super-low-power models intended for notebooks. "We will be competitive with products of superior performance over Intel offerings at the same clock speeds," promises an AMD spokesperson.

A similar strategy is being pursued by Chips and Technologies, which should begin shipment of its Super386 family in March and expects a half-dozen vendors to release PCs based on the chips.

Cyrix Corporation, which is preparing a low-power 386 of its own that is purportedly 50 percent faster than Intel 386 chips, is also pioneering a pair of low-cost math coprocessors for PC makers to put on the system board of *Windows* notebooks. Cyrix claims that its 87SLC chips take less space and run three times faster than add-on 387SX and 387DX coprocessors at the same clock speeds.

In the meantime, Intel has launched a 25-MHz 386SX meant for PCs sold primarily by mass merchants like Circuit City. One of the first vendors to adopt the chip is Advanced Logic Research with its $995 upgradable PowerFlex Flyer 386SX/25.

—*Mike Hogan*

Increase Battery Life by 25 Percent

Every laptop and notebook user who works a lot of hours away from power outlets wants just one more thing—longer battery life. Now Intel and Microsoft claim they've found a way to boost battery life as much as 25 percent.

Called Advanced Power Management, the Intel-Microsoft specification announced in January cooperatively links applications, operating system, hardware, and firmware for more efficient power management than had been previously possible. APM is built into the system BIOS and included as a driver in ROM versions of DOS 5.0 and a future ROM version of *Windows 3.1*. Later this year, APM-compliant applications should arrive. Then, working in concert, the APM operating system and applications will provide instant feedback to the BIOS on their changing power requirements.

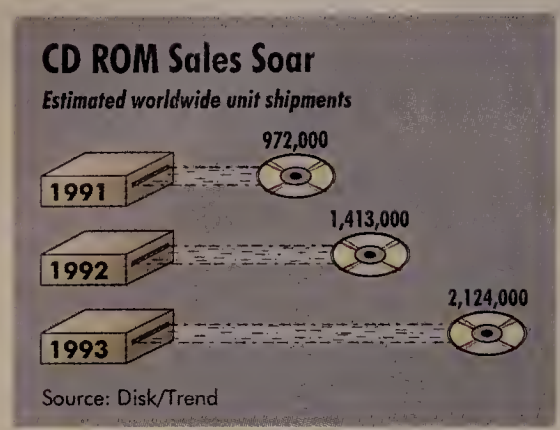
For instance, an APM-enabled *Windows* word processor would instruct the BIOS to throttle down CPU power between keystrokes, which has been possible only with DOS applications.

Notebook makers are rushing to incorporate APM. Dell Computer Corporation, for example, offers the feature in its 325 line, which began shipping in January. Says Michael O'Dell, vice president of product development, "We will offer it going forward on all our notebook products. You can have an application set the state of the CPU so when it doesn't need to compute, it can slow things down."

"This is a critical step in power management," says Steven Cox, notebook marketing manager for BIOS supplier Phoenix Technologies.

—*Russell Glitman*

New Apps Sell CD Drives



CD ROM drives are not yet standard PC equipment despite lower prices.

As the number of CD ROM packages soars and hardware prices drop, CD ROM drives are changing from curiosities to accepted computer peripherals. Total worldwide shipments will climb 45 percent to reach 1.4 million this year, by Disk/Trend estimates.

CD ROM drive sales have been held back for years by a lack of titles, notes Dataquest analyst Bob Gaskin, but about 3000 titles are now available. The optical disks deliver data bases, reference materials, games, educational material, training courses, and some standard business applications where the only alternative is a barrelful of floppy disks. Corel Systems actually bundles a drive with the CD ROM version of *CorelDraw 2.1*.

Microsoft now ships its multimedia version of *Works for Windows* exclusively on CD ROM, but despite all the hubbub about multimedia PCs, these flashy next-generation systems are selling far too slowly to have had much effect on the overall CD ROM drive market. Additionally, "CD ROM is not the best technology for multimedia," remarks International Data Corporation analyst Stan Corker. "The storage capacity may be adequate, but the data just comes off the drive too slowly."

More important to CD ROM's growth this year are bargain buys. CD ROM drive costs are "about half what they were two years ago," notes Gaskin, with street prices ranging as low as $400, although the average cost is considerably higher. Gaskin expects prices to continue to drop about 20 percent a year.

The $400 CD ROM drives available today are no-frills models that run significantly slower than more expensive offerings, and "you're probably giving up some reliability," says Disk/Trend president Jim Porter. He cautions that customers "should look ahead at other applications they'll want to run in the future, and make sure that the software will be compatible with the player they buy—not all CDs play in all CD ROM players."

—Eric Bender

DEC Goes Mail Order, Slashes Prices

Digital Equipment Corporation, the $14 billion computer giant synonymous with minicomputers, is making a bold effort to become a major force in the PC industry by selling direct, slashing prices on its existing PCs, and beginning a multimillion-dollar marketing campaign.

DEC is selling PC hardware, software, and services through a toll-free "Desktop Direct" telephone number. The company will continue to sell PCs through its traditional reseller channels.

Additionally, DEC is mailing out several hundred thousand catalogs to business PC buyers. These catalogs will highlight price reductions as great as 50 percent on DEC PCs, according to the company. A 20-MHz 386SX machine with 52MB hard drive, color monitor, DOS, and *Windows* lists for $1899, for example.

However, DEC is entering a crowded field in the mail-order channel populated by successful companies like Dell Computer, CompuAdd, and Gateway 2000.

DEC has a big task ahead. "Digital as a PC maker doesn't have the recognition we'd like to see," admits Dennis Schneider, DEC's desktop systems marketing manager.

DEC is matching the service and support plans of the mail-order leaders with some impressive plans of its own. These include custom-configured PCs, 24-hour toll-free telephone support, free delivery (for standard three-to-five-day service), optional next-day delivery, free one-year on-site service, and a 30-day money-back guarantee.

Meta Group analyst Frank Michnoff expects DEC to ship around 150,000 PCs this year and praises the company for its new aggressive stance. "They've done the right things to gain people's attention," Michnoff says. "Now they have to deliver on their promises."

—Jeff Bertolucci

WordPerfect Wages Word Processor War

Despite predictions to the contrary, WordPerfect Corporation is not ready to surrender its word processing crown anytime soon—if at all.

With *Windows* the hottest thing to hit word processing since the AT keyboard and WordPerfect woefully late with a slightly buggy *Windows* release, there's been no shortage of dreary forecasts for the Orem, Utah, company. WordPerfect answered the doomsayers with record sales in the 1991 fourth quarter, which ended December 31. Total revenue increased last year by nearly 18 percent to $532.6 million.

The increase was largely fueled by brisk sales of *WordPerfect 5.1 for Windows*, which shipped more than 426,000 copies in North America between its early-November release and the end of 1991. Total sales of *WordPerfect for Windows* topped $53 million in 1991.

"I'll be disappointed if we don't have 50 percent of the [*Windows*] market by mid-year," declares WordPerfect executive vice president Pete Peterson.

The jury is still out on *WordPerfect for Windows*, however. Jesse Berst, editor and publisher of the *Windows Watcher* newsletter in Redmond, Washington, points out that the bulk of early shipments represents pent-up demand for an overdue product. "The product itself is okay, but it's clearly a 1.0 release," Berst cautions. "And some *WordPerfect* users are finding it easier to upgrade to *Word for Windows* than to *WordPerfect*."

WordPerfect's renowned customer support, aggressive price promotions, and recently liberalized licensing policies have kept many of its users faithful despite delays and bugs that plagued the initial *Windows* release.

"We went from *WordPerfect 4.0* to *4.2*, from *4.2* to *5.0*, and from *5.0* to *5.1*," said Ivan Halperin, senior partner at the Los Angeles law firm Halperin & Halperin. "*WordPerfect for Windows* is in better shape than any of those."

—Rob Garretson

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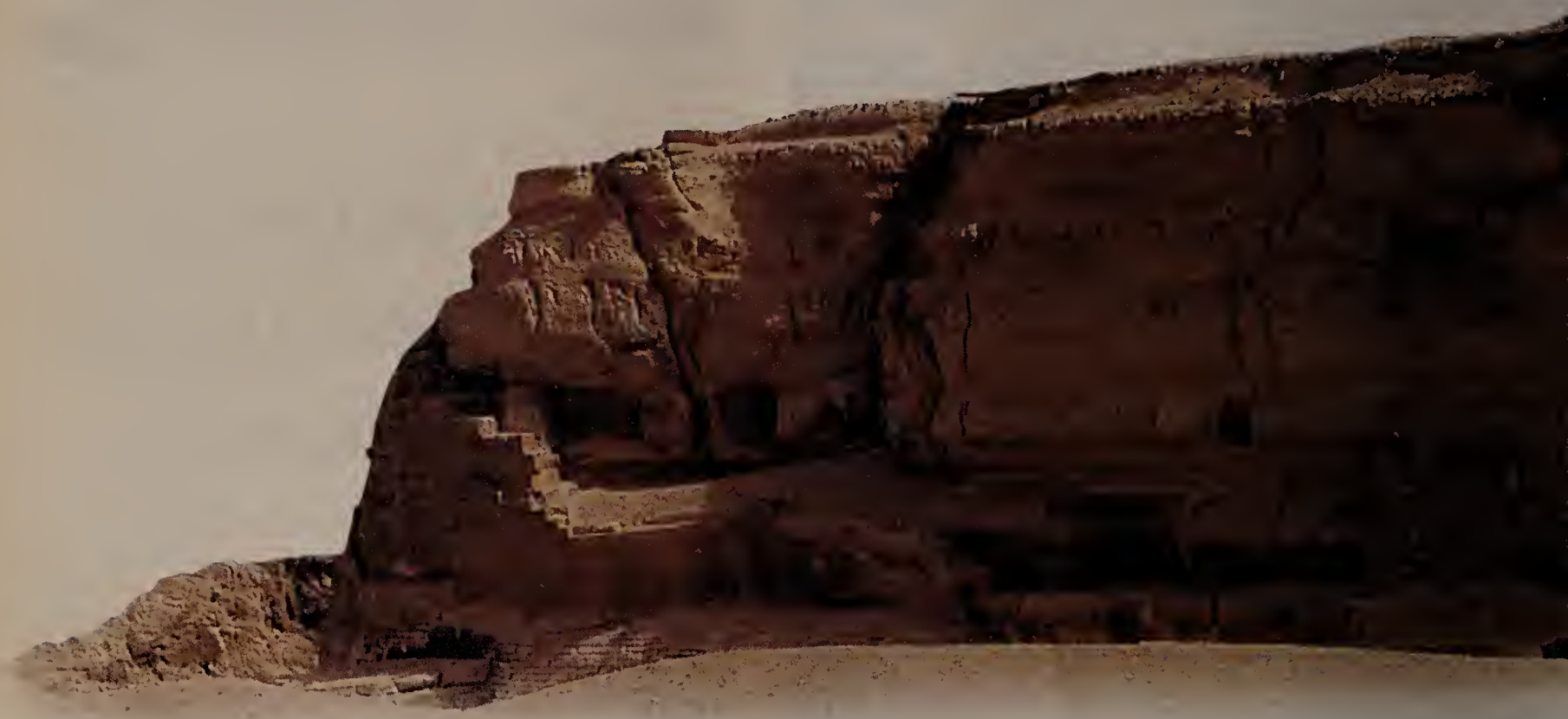

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   ☐ Decision-maker ☐ Decision-influencer ☐ None
3. What computer products have you been considering?
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   ☐ 486SX™-based systems ☐ 486DX™-based systems ☐ Notebooks
   ☐ Dedicated network servers ☐ LANs
4. How many computer systems do you already have at your company? _____
5. When will you most likely make your next computer purchase decision?
   ☐ Less than 3 months ☐ 3-6 months ☐ Within 12 months ☐ Don't know
6. What applications will you be running?
   ☐ Word Processing ☐ Accounting ☐ Spreadsheet ☐ Desktop publishing
   ☐ Database ☐ Networking ☐ Other _____
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CODE N2603

WHAT ? NEXT

By Mike Hogan

Processor Wars = User Bonanza

More microprocessor suppliers mean more PC innovations and lower prices

MICHAEL LLEWELLYN

The Advanced Micro Devices T-shirt seen heading into Austin's Lone Star Cafe, reads: "And then there were two."

Actually, there are more than two manufacturers of Intel-compatible microprocessors now that Chips and Technologies (C&T) and others have announced their intentions. But so far, it's been the longhorns (AM-386DXLs) and shorthorns (AM-386SXLs) moseying out of AMD's Austin facility that have been putting steak instead of hamburger on our desktops.

Okay, so you may not own a PC with an AMD processor, but you benefited when AMD broke through Intel's monopoly over IBM-compatible CPUs. Intel is understandably miffed that AMD used its microcode to do it. That's for the courts. What I know for sure is that no monopoly is in the best interest of people who buy things.

AMD has amply demonstrated through innovation and sales that things were not just hunky-dory under the regime of a single processor vendor. In nine months, it lassoed $250 million worth of the $1.3 billion market for 386s—charging roughly the same prices as Intel. Whaddya think? Could there have been a little unsatisfied demand out there?

At introduction, AMD's 386SXL and 386DXL chips ran faster and consumed less power than their Intel counterparts, pushing Intel to introduce faster chips sooner. AMD was the first to ship still-lower-power 3.3-volt processors, the 386SXLV and 386DXLV, which should help boost notebook battery life to 6 hours by summer.

Intel is coming back this year with its own 3.3-volt chips and innovations like dual-speed processors that pump more MIPs without making more electromagnetic waves or heat. In any case, the company deserves our thanks, not derision. It started the revolution, but one company has about as much chance of single-handedly serving a market as Gorby's Ministry of Piggly Wiggly had of bringing home the bacon.

Historically, Intel kept its gross margins in the 90 percent range by rounding us up and moving us out to more expensive processors. It controlled supply and kept prices dropping an orderly 5 percent a quarter. But AMD is happy to live on 50-point margins, so Intel had to slash 386 prices up to 35 percent this quarter.

Consider prices officially out of control. As Instat vice president Dean McCarron notes, the days of 386 shortages are clearly over. Intel is pumping out cheap 486SXs as fast as it can to move us off 386s, but now AMD will have i486 compatibles, too. Intel will counter in a few months with its ("don't call it a") 586. But I still won't need a small mainframe by then, so I'll probably take the savings available on a 486SX.

At this writing, a 486SX/20 CPU costs $210, a 486SX/25 is $300. Double that for a rough idea of the processor's share of your PC price tag. The way things are going, I may be able to pick up a name-brand 486SX for $1500 to $1800 by summer, about a third less than today.

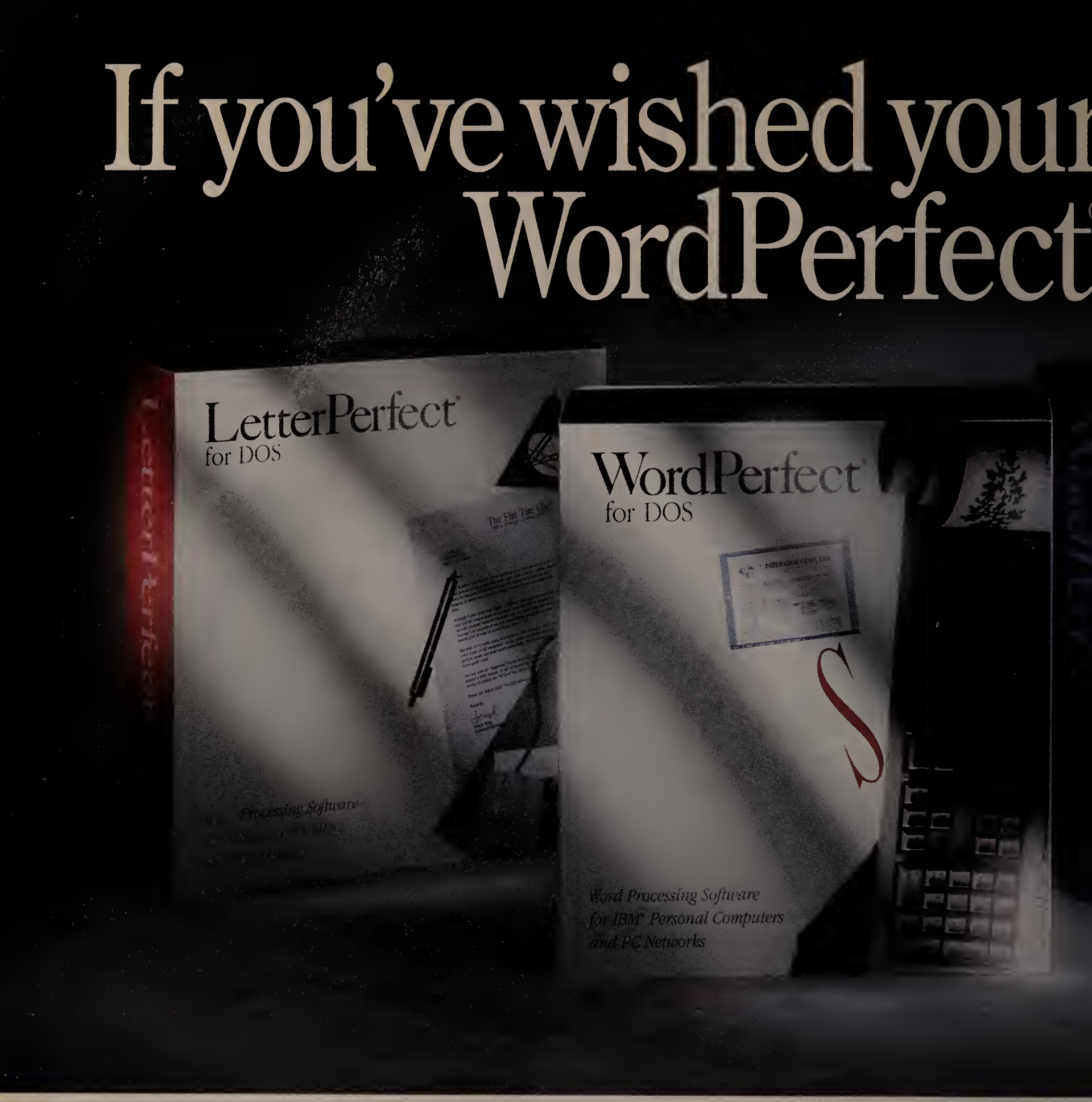
That's just for starters. As C&T and others come on line, the PC biz is going to start looking like the Lone Star on a Saturday night.

WHAT TO WATCH

What makes the Hottentot with an **HP 95LX** so hot? **1-2-3**, not the PIM pack that Lotus also wrote for that machine. Still, expect to see a re-**Lotus Work**ed and workable version of those PIMs popping up on a slew of new subnotebooks in coming months . . . . Several impressive notebook intros lately, but wait for summer. By then **AST** will be out with its new generation of 3.3-volt slimlines offering a combination of low price **AND** long battery life . . . . New backlighting and power management in **Compaq's LTE Lite/25** yields an impressive **4½** hours of battery life. What if Compaq's next note has **3.3-volt** components? . . . . Before quarter's end, you'll be able to **Manage Your Money** on line through mutual fund broker **Fidelity. Fidelity Online Express** will let you buy and sell 24 hours a day and have your **MYM** portfolio automatically updated.

Questions? Contact me at 213/312-8041, or MCI Mail 329-2648.

If you've wished your WordPerfect®



Maybe your old word processor is a bit out of date. Perhaps the files aren't compatible with other word processors in your office. And it probably just doesn't have the power or the features of WordPerfect®.

But it may still serve a purpose: because now, for a limited time, you may be able to turn your old word processor into a WordPerfect word processor. Just trade it in and get substantial savings on the WordPerfect version of your choice. And if you haven't made the choice between DOS, Windows and OS/2, that's fine. Because when you trade up to WordPerfect, you can be licensed to use all three on one machine.

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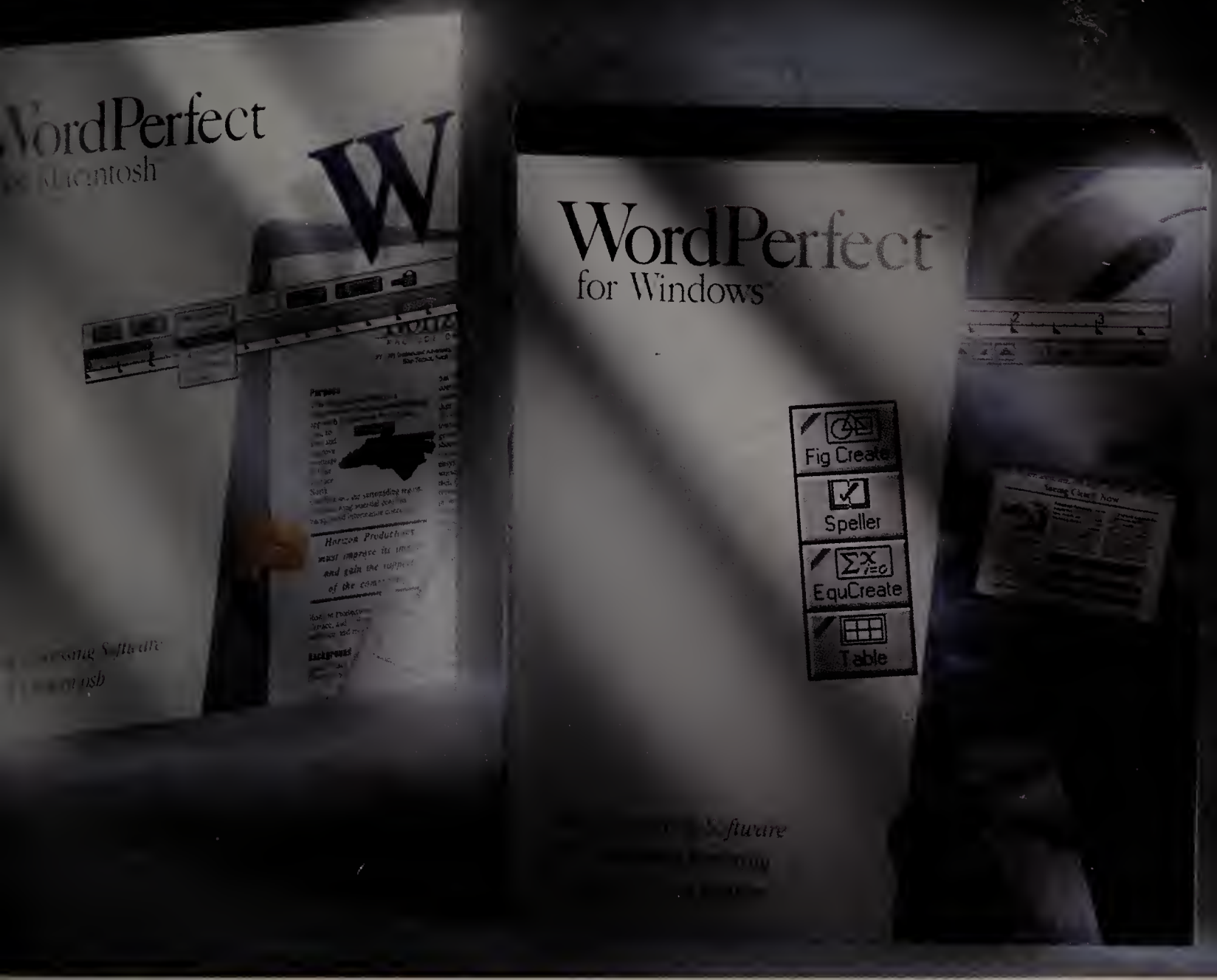
word processor were you're in luck.



Each trade-up offer is a little different, depending on the WordPerfect version you want.

Users of certain DOS, Windows, and Macintosh word processors can trade theirs in to get the corresponding WordPerfect product for just $150 ($179 in Canada). You can even get LetterPerfect® for just $89 ($110 in Canada) when you trade in one of the appropriate word processors. And we also have a trade-up offer for those of you on UNIX, VAX or Data General machines.

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Circle 255 on reader service card

LETTERS

Reactions and responses from the PC World community

WAYNE VINCENT

Does Piracy Pay?

I'm a faithful reader of *PC World*, and I enjoy reading information and responses from other readers. The letter on the cost of software piracy [October 1991] raised an especially important issue. Recent articles in various magazines have laid out the cost to software vendors in dollars and cents. But these analyses leave out one consideration: Pirated software often serves as a marketing tool for software publishers, because many people who like and use pirated copies become legal owners when upgrades are released.

This is not to say that I approve of software piracy. Apart from the ethical issue, being a registered owner has advantages: phone and on-line software support, low upgrade prices, technical information, and, in the case of some software publishers, newsletters. I firmly believe these benefits make it worthwhile to be a registered user.

David P. Ristau
Jacksonville, Florida

The Downside of Fast Development

The short life span of Borland's software makes me hesitant to purchase or even upgrade to the "latest" version of its products. For example, I purchased *ObjectVision* for $99.95 in July. Four months later I received an upgrade notice from Borland, which explained that the upgrade will cost me $49.95, 50 percent of the original price. I am not eligible for a free upgrade because it's available only to those who purchased *ObjectVision* after August. I want to purchase *Paradox* and *Quattro Pro* now, but I'm putting it off because the *Windows* versions of both packages are arriving at some unspecified time. I don't want to pay now and pay again in another few months.

Colin Chow
Brampton, Ontario, Canada

386 and Counting

We at Zeos agree with your conclusions in "33-Something: Still Hot After All These Years" [the follow-on story to the 486SX review, December 1991]. The 386/33 systems are a terrific buy and for many users can be a smart alternative to a 486SX. But the Zeos system evaluated in the Test Report was discontinued several months ago. Our new line features upgradable CPUs and uses a more highly integrated chip set and a faster hard drive, which we believe will increase performance.

Rick Apple
Vice President, Marketing
Zeos Int'l

We regret that Zeos's new 386/33 arrived too late to be included in our benchmarks. Zeos fans who'd rather move up to a 486SX should check out Zeos's entry in this month's roundup of 486SX and 386/40 machines. —Ed.

Who Put the "Super" in Superstores?

I was rather dismayed at Christine Whyte's article about superstores in *Consumer Watch* [December 1991]. Recently I bought two 25-MHz 386 systems from a local CompUSA store. I did not find knowledgeable technicians or a helpful staff. To find out the amount of usable RAM in these machines, I had to make four phone calls and a 45-minute trip back to the store. This level of support is unacceptable.

The bottom line is that this "superstore" sells machines at a good price, but after you pay, you're on your own unless the machine is broken. I hope that Ms. Whyte's article was not written in order to entice large computer stores to advertise, and was based instead on actual contact with a small sample of stores. Through factual reporting and recommendations, *PC World* needs to force these stores to satisfy customers.

Robert N. Armstrong
Leavenworth, Kansas

The research for the superstores article was done by four reporters who each visited one store in their area. They posed as average customers so they would receive the same treatment as anyone else. This article was intended as an informal survey of four stores, not a structured sampling representing every store in each chain. Unfortunately, Mr. Armstrong discovered that

ANTHONY RUSSO

the quality of service varies with individual stores. —Ed.

Gone South

What happened to *Two-Fisted Management?* I really miss Mr. Harris's antics now that he's on vacation.

John Irvine
Fairfax, Virginia

After a lengthy stint at PC World, *Mr. Harris has retired. Reader surveys we conducted during the past year showed that we could best serve most readers by devoting that page to other editorial material. We'll continue to monitor reader reaction, though, and may reconsider our decision if response warrants it. —Ed.*

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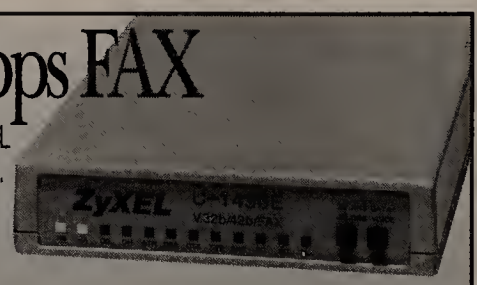
ZyXEL modems let you talk fast. At 14,400 bps, ZyXEL modems offer incredible speeds at low, low prices. Reliable, error free data transmission is assured at speeds from 300 bps to 57.6Kbps, while offering V.42 and MNP®4 error correction.



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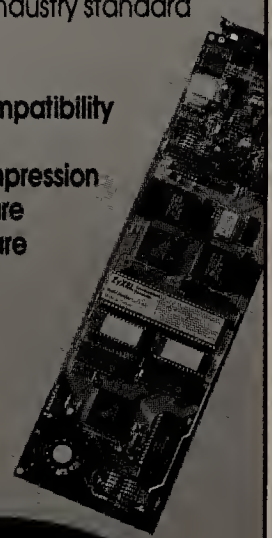

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Circle 318 on reader service card

Microsoft Isn't the Only Front-Page News

I don't get it: Microsoft releases DOS 5.0, and you give it front-page coverage in your July 1991 issue. Yet in the same article, you acknowledge that DR DOS 5.0 is a better product [in the sidebar "DR DOS 5.0—Prophet in the Wilderness"]. In September, Digital Research released DR DOS 6.0, and I didn't hear a word about it in your October issue. Why so mum? If this product is really as good as Digital Research claims it is, I can't imagine anyone choosing Microsoft's DOS.

John Grothues
Houston, Texas

Even though we did not give DR DOS 6.0 front-page coverage, we did write about it in our January 1992 issue. We have not compared the two products in a head-to-head review. We did note, however, that many features of DOS 5.0 were already available in the Digital Research product. —Ed.

GeoWorks Ensemble: A Choice GUI

After reading "The Readers' Choice: 1991 World Class Awards" [October], I decided to do some research and came up with interesting numbers. I pulled every computer magazine I purchased in the last six months. I counted 74 articles, sidebars, columns, and surveys and an entire issue of a magazine dedicated to *Microsoft Windows, Windows* software, and *Windows* hardware—for a grand total of 271 pages. In the same group of magazines, I found 11 articles and sidebars about *GeoWorks Ensemble*, totaling 14 pages. Yet *Ensemble* was second to *Windows* by only a 4 percent margin in your Most Promising Newcomer awards category. I find the lack of coverage of this popular software package discouraging. *Ensemble* is an excellent GUI, which, given some support and time, could give *Windows* a run for its money.

Jack Reed
APO AE

Data Compression of course, but

Which One?

Why not go with the real-time data compression software being used by more PC users worldwide!

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SuperStor 2.0 provides up to 25% greater compression than before! It's the fastest, most advanced product of its kind, with many unique features that make it more powerful, easier to use, and far more flexible than the competition. Just look at the chart to review SuperStor's numerous features–many of which are not offered by other compression products.

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Universal Data Exchange allows compressed floppies or removable drives to be read and saved by any PC!	YES	NO
Fully integrated menu-driven software program offers ease of installation and operation!	YES	NO
Advanced Compression Utility Tool Kit scans, checks, and repairs compressed data!	YES	NO
Advanced Disk Optimization Utility defragments or consolidates compressed data for optimal disk performance!	YES	NO
Highest compression ratio of any data compression software (up to 25% greater with version 2.0!).	YES	NO
Automatically updates CONFIG.SYS on physical partition to further enhance transparent operation!	YES	NO
Dynamically adjusts drive capacity to fit more data on compressed disks with less effort!	YES	NO
Performance enhancing Disk Cache results in faster system performance!	YES	YES
Device driver easily loads high, maximizing conventional memory for RAM-intensive applications!	YES	YES

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Circle 2 on reader service card

Back to Basics

I subscribe to two PC magazines for the sole purpose of gleaning information about what's available and how to use it. I certainly have found what's available, but I still don't know how to use it. Most articles assume that all readers know your computer buzzwords, abbreviations, and unexplained capital letters. It would be of great value to read a beginners' series in your magazine. There are still a lot of us who need to learn to crawl before we run.

J. E. Way
Fort Worth, Texas

Our monthly How To columns should help you get going. Don't be put off by a technical tip or two—we also regularly run advice for beginning DOS and Windows *users. Because we can't cover all you need to know every month, we also recommend that you make use of your programs' help. —Ed.*

Corrections and Clarifications

In our December 1991 article "Hard Disks," we printed the wrong price for the Pacific MagTron MT-4115E/S. The correct price is $499.

Power Tip No. 228 (page 36) in the December 1991 issue should have said that when you create a Lotus *Magellan* macro, the first step is <Alt>-<F7>n. *PC World* regrets the errors.

Send your reactions, responses, and ideas to Letters, PC World, *501 Second St. #600, San Francisco, CA 94107; CompuServe 74055,412; MCI Mail PC World Editorial; or 415/442-1891 (fax). Include your name, city, state, and phone number. We reserve the right to edit letters.*

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POWER TIP NO. 236

Word for Windows Quickies

You can easily select a word by placing the mouse cursor on the word and double-clicking. To select an entire paragraph, move the mouse pointer left until it changes to an arrow, and double-click. To select more than one paragraph, select a paragraph, continue to hold down the mouse button, and then scroll the arrow up or down the page. To highlight an entire document, place the arrow pointer anywhere along the left margin, hold down <Ctrl>, and click.

Paula Moreira
Elizabeth, New Jersey

Presenting
The Next Page
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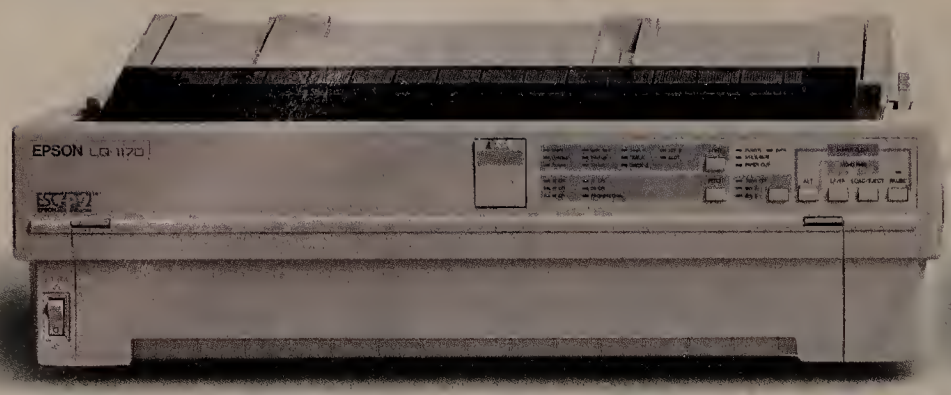
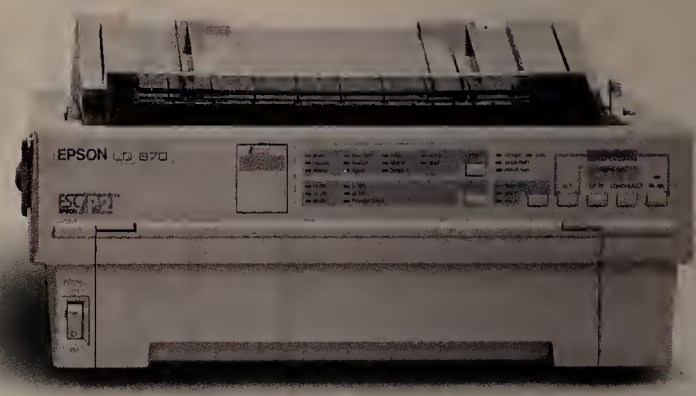
From The Company
That Printed
The First.





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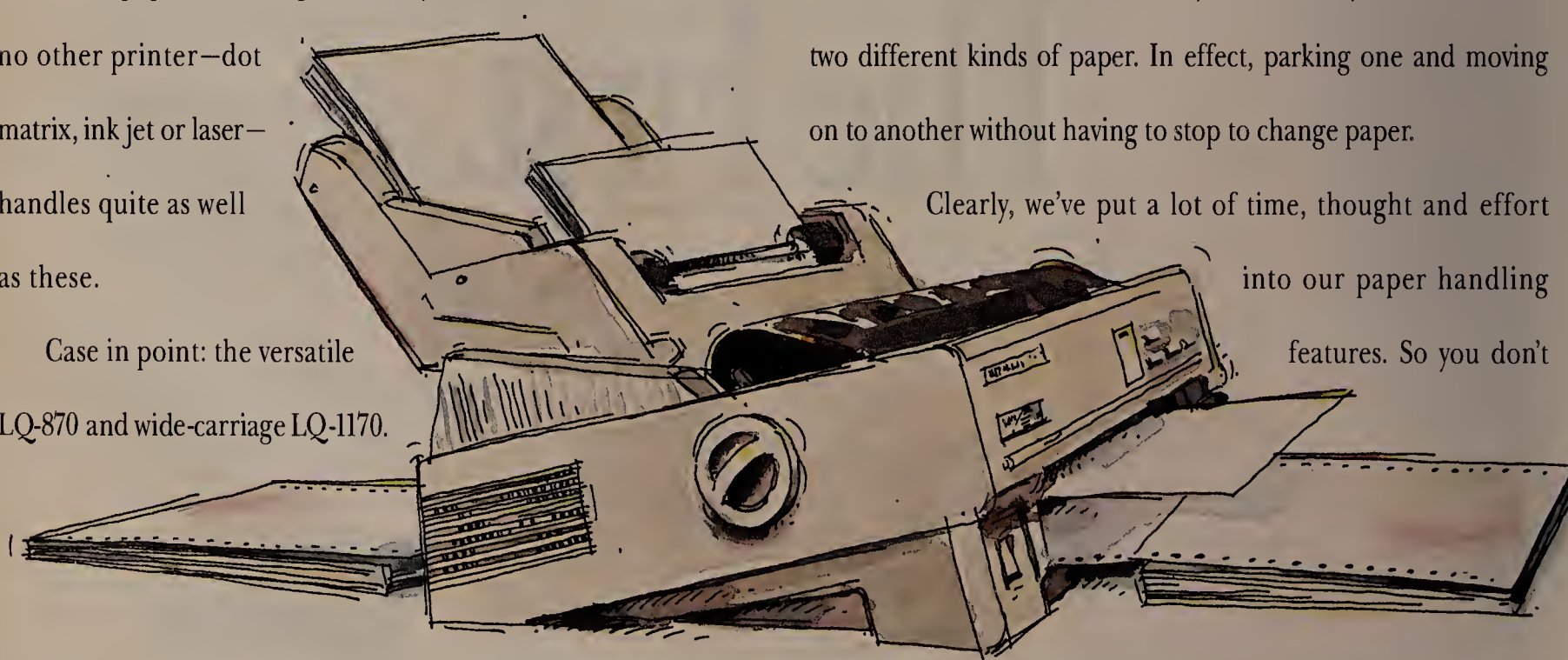

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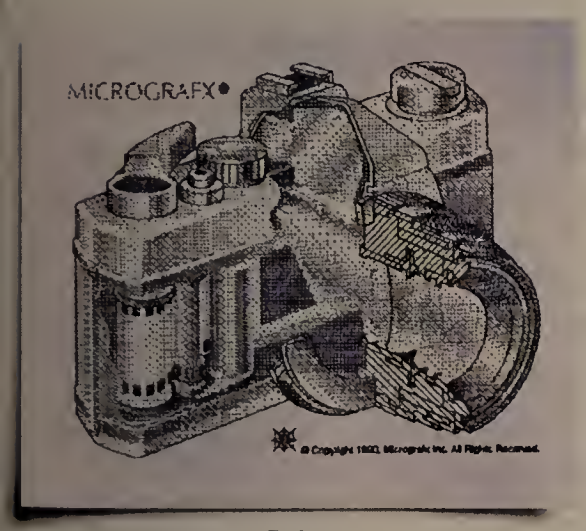

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PC Magazine, June 25, 1991

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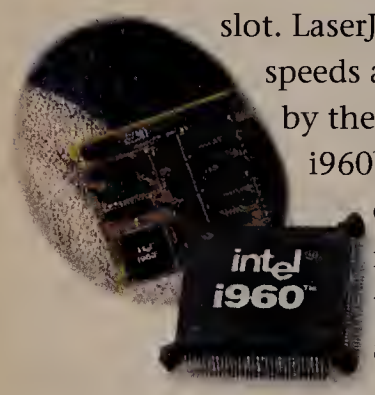

"An Intel i960 RISC processor on the accelerator board helps the PacificPage XL print graphics more than six times as fast as the HP PostScript Cartridge."

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THE HELP SCREEN

PC World offers answers and advice at every level

by Karl Koessel and Robert Lauriston

Breaking Windows Within Windows

Q. *In our office, the mix of* Windows *and DOS applications has resulted in constant trouble with our many shared computers. One person opens up a DOS prompt under* Windows, *does some work, and walks away from the computer, forgetting to exit to* Windows. *Someone else walks up, sees the C> prompt, and starts another copy of* Windows. *Since this second copy of* Windows *is in real mode, suddenly most of our programs don't work. Is there any way to stop* Windows *from starting a second copy of itself from a DOS session?*

Kate Mahoney
Brooklyn, New York

A. Upgrading to *Windows 3.1* will solve your problem—it won't let you start a second copy. In the meantime, here are two ways you can avoid trouble.

This first method is quite effective and easy to implement. First, open File Manager, click the C: drive icon, select *File • Search*, type **WIN.COM**, and press **<Enter>**. (If the 'No matching files were found' message appears, press **<Enter>**, select your next hard drive, and try again.) When File Manager finds WIN.COM, it will open a Search Results window with WIN.COM highlighted, preceded by its drive and directory. Select *File • Rename*, type **WINONCE.COM** (or some other unused file name), and press **<Enter>**. Leave File Manager open, return to Program Manager, and open Notepad. Enter the four lines shown in **LISTING 1**. If File Manager's Search Results window shows that WIN.COM is not in C:\WINDOWS, change the listing appropriately. Save the file as WIN.BAT in the same directory where you found WIN.COM.

If your AUTOEXEC.BAT file runs *Windows*, you have one last step: Return to Program Manager, select *File • Run*, type **SYSEDIT**, and press **<Enter>**. Find the line that runs *Windows;* it should read WIN, WIN.COM, C:\WINDOWS\WIN, or something similar. If there are any commands after that line, insert the command **CALL** and a space in front of the *Windows* command. Also, if the command includes the COM extension, change the extension to BAT. Exit *Windows* and type **WIN**. From now on, whenever anyone opens a DOS window in *Windows*, the DOS prompt will display a reminder that *Windows* is already running.

A more radical solution is to delete the file KERNEL.EXE from *Windows'* SYSTEM subdirectory. This prevents *Windows* from running additional copies of itself. Before zapping the file, though, make sure you don't have any pre-*3.0 Windows* apps that run only in real mode—without KERNEL.EXE, *Windows* runs only in standard and 386-enhanced modes.

Multitasking on a LAN

Q. *We have a small NetWare 2.2 LAN and are interested in multitasking at our workstations. We want to access* dBASE *on the server, set a report program in motion, jump out, run* Quattro Pro *from the local drive, play around with that, and come back to* dBASE *when the report is done. Is* Windows *the answer? How much memory would the workstation need?*

Preston Stern
Philmont, New York

A. Running *Windows 3.0* in 386-enhanced mode is one way to handle the tasks you describe. You'd need 386 or 486 workstations with at least 4MB of RAM. Another option is to run *Desqview.* Since you're running only DOS applications, you'd get better performance, and *Desqview*'s hardware requirements are lighter. There's a version that runs on 286 systems, and it would demand only about 1.5MB of RAM. In either case, both *dBASE* and *Quattro Pro* will run slower than usual, since they'll be sharing the CPU.

```
@ECHO OFF
PROMPT Enter "exit" to return to Windows.$_$P$G
C:\WINDOWS\WINONCE.COM %1 %2 %3 %4 %5
PROMPT $P$G
```

LISTING 1: Rename WIN.COM to WINONCE.COM and name this batch file WIN.BAT to prevent users from running Windows within Windows.

ANTHONY RUSSO

Since you're on a network, there's a third alternative: You could use LAN remote-control software such as *pcAnywhere, PC-Remote, Carbon Copy,* or *Central Point Commute* to turn a spare workstation into a batch server. You load a memory-resident utility on the batch server, then run the remote-control software on your workstation and use it to take control of the batch server. Video and keystrokes are sent across the LAN, as if you were actually sitting at the batch server. Start your *dBASE* program, exit the remote-control program, and fire up *Quattro Pro.* Since the batch server devotes 100 percent of its power to the data base program, it should run at least twice as fast.

If you start your *dBASE* program with a batch file, use NetWare's SEND utility to tell you when the program has finished. Just add the line **SEND "Batch job completed." TO** followed by your log-in name to the end of the batch file.

Upgrading a 286 for Windows

Q. *I would like to upgrade my IBM AT to run* Windows *so I can use* Excel *and* Word for Windows. *The system currently has 640K of RAM and Hercules graphics. Would it be sufficient to upgrade the system RAM with an expansion board, or should I bite the bullet and upgrade to a 386?*

Jörg Haas
Quito, Ecuador

A. We find *Windows* irritatingly slow on a 286, but we've talked with people who find it acceptable. Your best bet is to find someone who's running *Windows* on a slow 286 (or one that can be switched to run at 8 MHz), spend a few minutes using it, and make your own judgment. Our satisfied 286-bound friends all have 4MB of RAM, so if you stick with your old AT, we suggest you install at least that much memory.

Windows will also look a little funny on your old system. Since the *Windows* fonts and displays used with Hercules graphics were designed for EGA's 640 by 350 resolution, they look a bit squashed when displayed in Hercules 720 by 348 mode. Circles turn into ellipses, and squares turn into rectangles, which is particularly annoying with paint and draw programs, since printouts don't match what you see on screen.

Recycle Your Laser Printer Cartridges

Q. *My office has been turning "green" lately. We use stationery made from recycled paper, and we've got recycling bins for paper, bottles, and cans. I've heard you can recycle laser printer cartridges. How do we do it?*

Paul Hoffman
Berkeley, California

A. Hewlett-Packard recently set up a cartridge recycling program. Return your empties and HP will reuse some of

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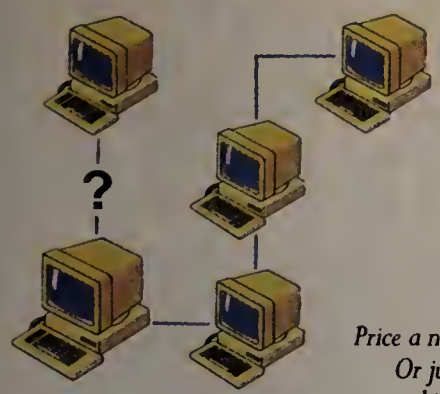

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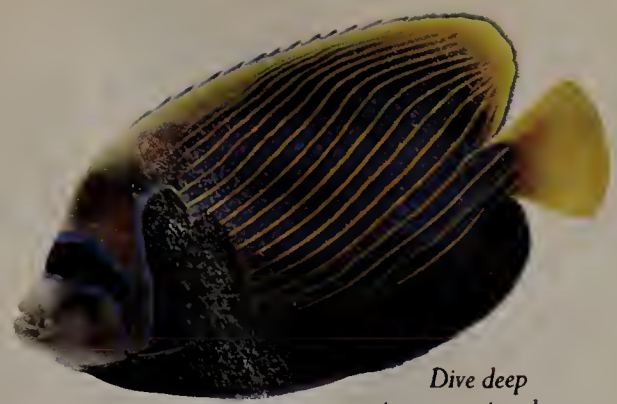

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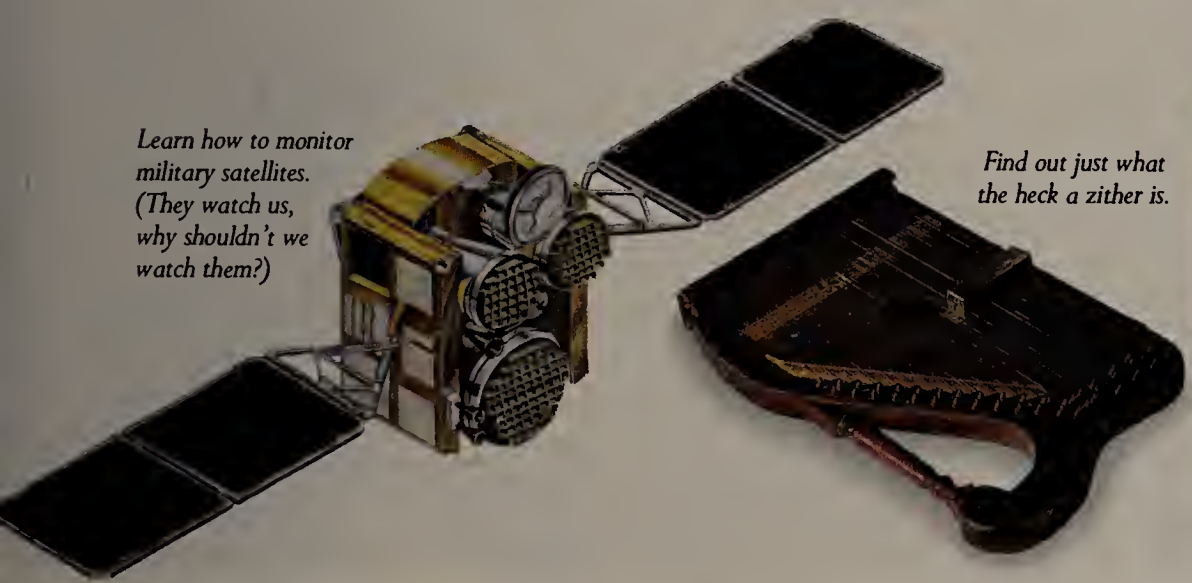

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the parts and recycle the rest. Call the company at 800/752-0900 ext. 1872 for a stack of prepaid shipping labels.

That's not your best deal, though, because other companies are eager to *buy* your used cartridges. To find one, see the January 1992 *Consumer Watch*, check the yellow pages under Computer Supplies, or look in the Supplies section of the *PC World Catalog* advertisements in the back of this magazine.

3½-Inch Drive in 5¼-inch Bay?

Q. *We have computers here with unused 3½-inch floppy drives, but the systems where such drives would be useful have only 5¼-inch bays. Can we install a 3½-inch floppy drive designed for 3½-inch drive bays into a 5¼-inch drive bay?*

Scott Berkun
Bayside, New York

A. Yes. In fact, most 3½-inch drives are mounted in 5¼-inch bays, so any computer shop should have the necessary brackets. If you have trouble finding a faceplate that fits, check with the manufacturer of the computer and the manufacturer of the drive; one should have the proper part.

Printing Extended Characters

Q. *My Epson FX-80 dot matrix printer doesn't use the standard IBM character set for ASCII characters above 127. For ASCII values 128 to 254, you have to send one character to the video board for screen display and a different one to the printer for output. Can I set up* WordPerfect 5.1 *to do this?*

L. E. Reilly
Houston, Texas

A. You don't need to do that. *WordPerfect, Microsoft Word,* and other major word processing programs now handle this task automatically. (Just be sure you're using the appropriate printer driver.) The only time you'd need to do it yourself would be if you had an unpopular printer for which no driver was available—not an issue with the FX-80.

Some older programs, like *WordPerfect 4.2,* require you to enter screen or printer codes manually in a lookup table. Others simply don't support non-IBM characters.

Installing a 32MB RAM Disk

Q. *We need to set up a 32MB RAM disk for one of our applications. MS-DOS 5.0's RAMDRIVE.SYS goes up to only 4MB. We have previously used PC-DOS 3.3's VDISK.SYS to set up 8MB RAM disks. Is there a DOS 5.0–compatible RAM disk utility that will create a 32MB drive?*

Dr. T. Pappan
Owosso, Michigan

A. You can use your PC-DOS 3.3 VDISK.SYS driver with DOS 5.0. First you have to run the DOS command **SETVER VDISK.SYS 3.30** to update SETVER's version table. This way DOS 5.0 will trick VDISK.SYS into believing that DOS 3.3 is running. Then you must type the line **DEVICE=C:\DOS\SETVER.EXE** in your CONFIG.SYS file. But you're still limited to 8MB.

Fortunately, there's an alternative that will give you a larger RAM disk. The utility 386DISK.SYS, which comes with Qualitas's *386MAX 6.0* memory manager, can create RAM disks with capacities up to 32MB.

WHERE TO BUY

386MAX 6.0
Qualitas, Inc.
7101 Wisconsin Ave. #1386
Bethesda, MD 20814-4805
800/733-1377, 301/718-6061 (fax)
LIST PRICE: $99.95
Reader service no. 690

Fit More Files in Your RAM Drive

Q. *I set up a 1MB RAM disk on a D: drive using VDISK. After I write 62 files into drive D:, I get an 'unable to create file' message, even though the RAM disk still has plenty of room. However, if I create a subdirectory in D:, I can load it up fully. Why is that?*

Robert S. Babin
Rancho Palos Verdes, California

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A. A default VDISK's root directory can hold a maximum of 64 file name and directory entries. (Yours maxes out at 62 because it also has 2 hidden files.) And like any other disk, the number of entries in a subdirectory is limited only by the size of the disk. You can raise the number of root directory entries to 512 files by modifying your CONFIG.SYS file's VDISK line. For example, in 'device=c:\dos\vdisk.sys 1024 512 300 /e', the '1024' indicates a 1MB RAM disk (1024K = 1MB), '512' sets sector size to 512 bytes, '300' reserves root directory space for 304 entries, and '/e' creates the virtual disk in extended memory. Note that the sector size can be only 128, 256, or 512 bytes. Also note that VDISK adjusts the number of entries to fill the sectors used (304 32-byte entries fit in the 19 512-byte sectors needed to hold 300 entries) and that in DOS 5.0, you use RAMDRIVE.SYS to create a RAM disk and can have up to 1024 root entries.

From PC to TDD

Q. *Are there any adapters or boards available that will allow me to use my PC as a Telecommunications Device for the Deaf (TDD)?*

Allyson Seay
Marrero, Louisiana

A We know of one such product, Microflip's MIC300i. This half-length internal modem can communicate with TDDs and regular modems too (though only at 300 baud). Bundled software includes a telecommunications package that handles both TDD calls and BBS sessions, and a memory-resident pop-up that lets you make or answer TDD calls without exiting your other applications.

WHERE TO BUY

MIC300i
Microflip, Inc.
11211 Petworth Ln.
Glenn Dale, MD 20769
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301/262-6020 (TDD)
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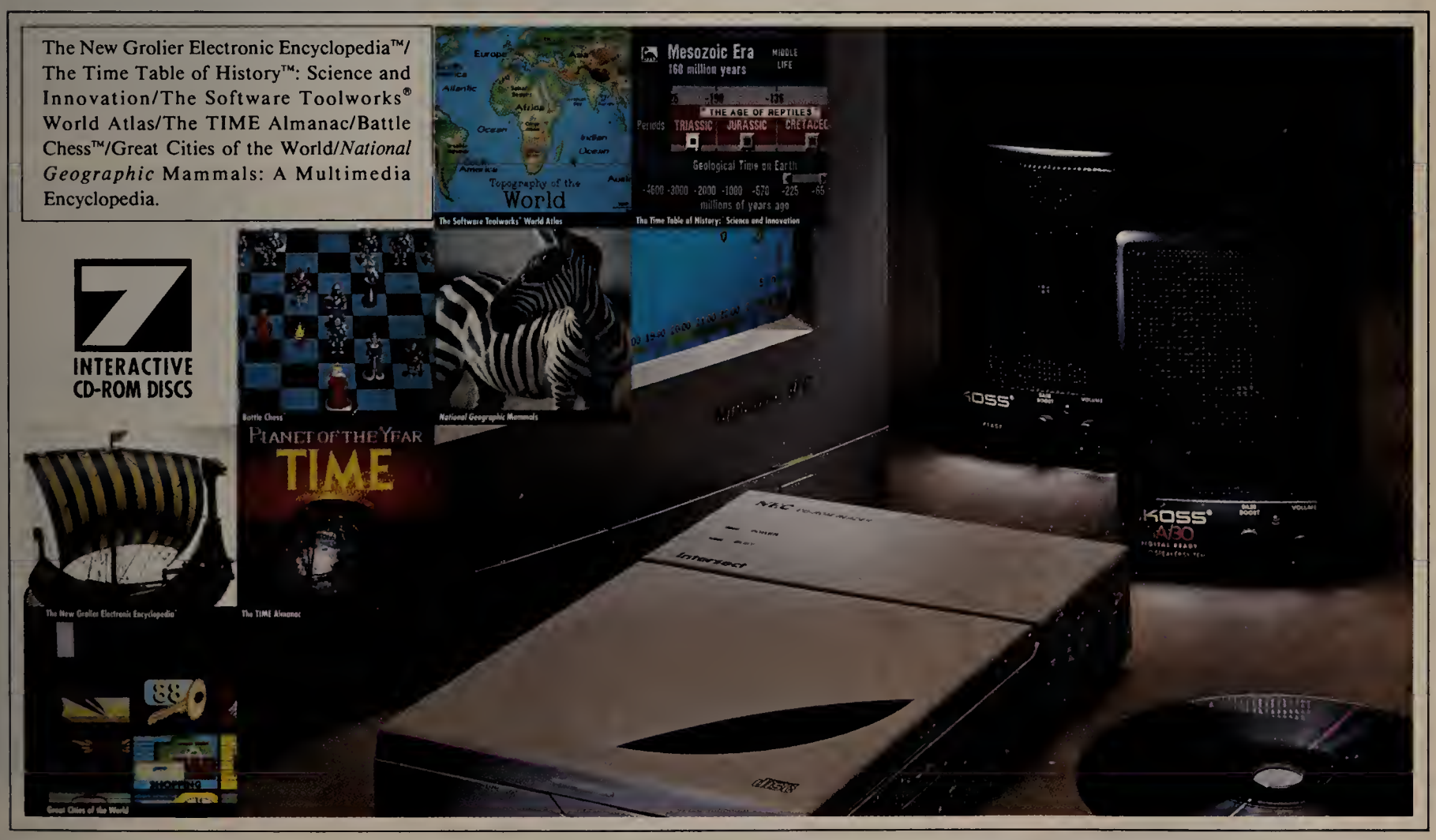

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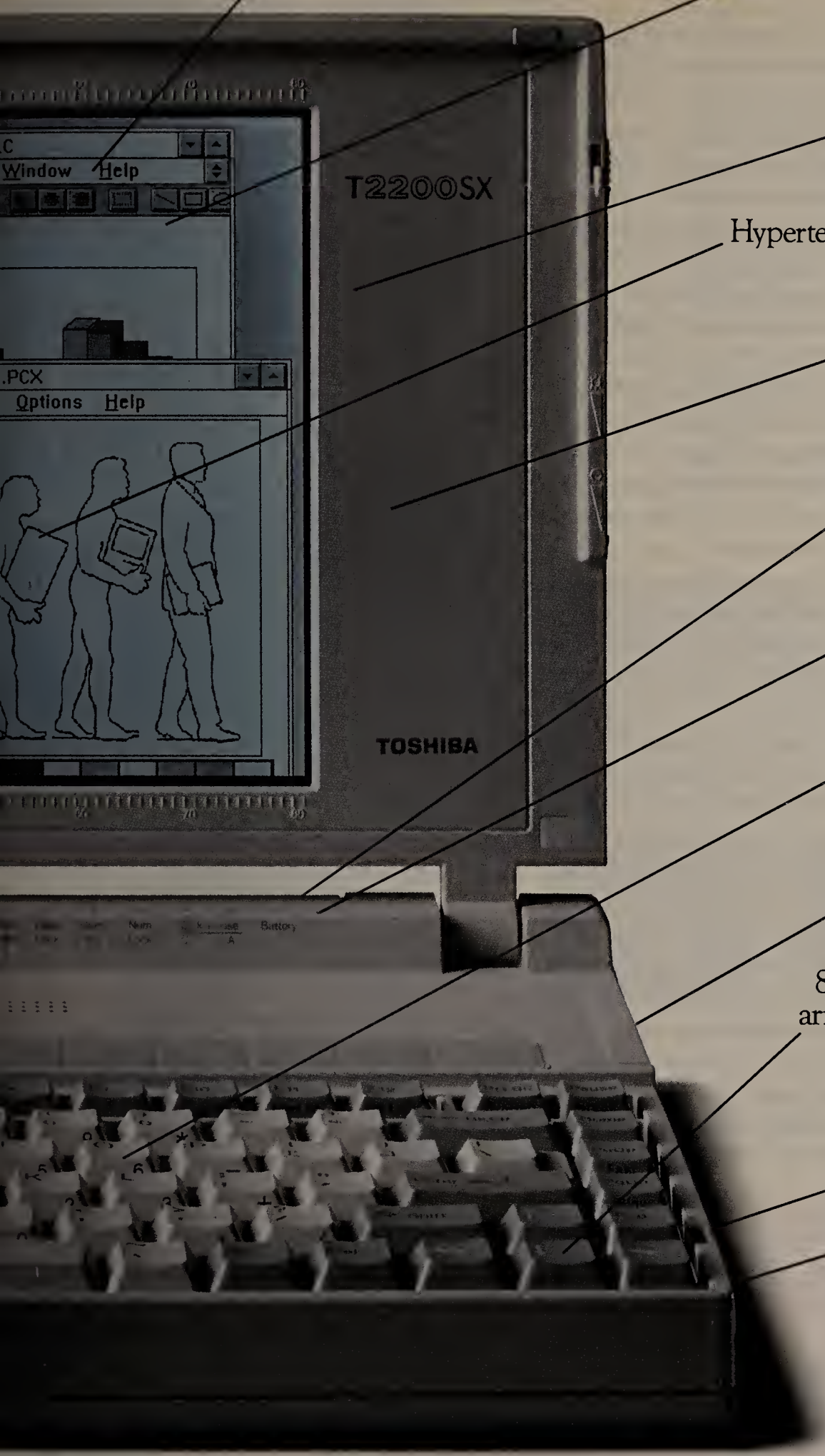

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Epson Print Control in dBASE

In our October 1991 column, we told Eric Vitols that his difficulty probably was due to a defect in his printer's Epson emulation. We goofed—it's actually due to *dBASE III*'s use of ASCII 0 as a string terminator, which conflicts with the Esc-w0 (ASCII 27-119-0) sequence that Epson dot matrix printers use to turn off double-high mode. Our thanks to reader Robert Kurzon.

In *dBASE III* and *III Plus*, the workaround is to turn off the printer's eighth-bit recognition using Esc-= (ASCII 27-61). Then you can send Esc-wç (ASCII 27-119-128), which, stripped of its eighth bit, turns into Esc-w0. Then turn eighth-bit recognition back on with Esc-> (ASCII 27-62).

The *dBASE IV* ??? command can send ASCII 0; just use **??? "{esc}w{null}"**.

Send your questions to Robert Lauriston, CompuServe 73707,1731; MCI Mail 381-7106; Internet duck@well.sf.ca.us; or 415/442-1891 (fax); or mail them to The Help Screen, PC World, *501 Second St. #600, San Francisco, CA 94107.* PC World *pays $50 for published questions. Sorry, we cannot acknowledge submitted materials.*

Karl Koessel is the technical editor and Robert Lauriston a contributing editor for PC World.

POWER TIP NO. 237

WordPerfect Table Cuts

In *WordPerfect 5.1*, you can delete a math formula from a table quickly by going into Table Edit mode (**<Alt>-<F7>-TE**), placing the cursor anywhere in the formula cell, and pressing **<Backspace>**.

Bradley Baird
Orem, Utah

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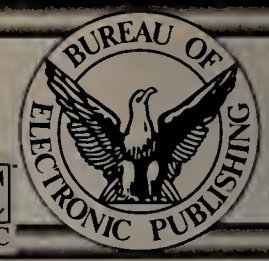

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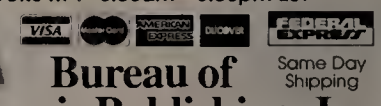

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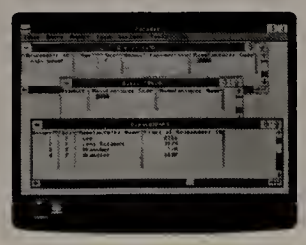

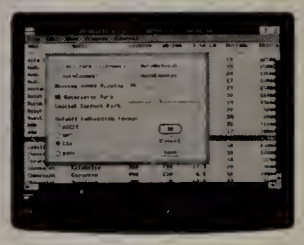

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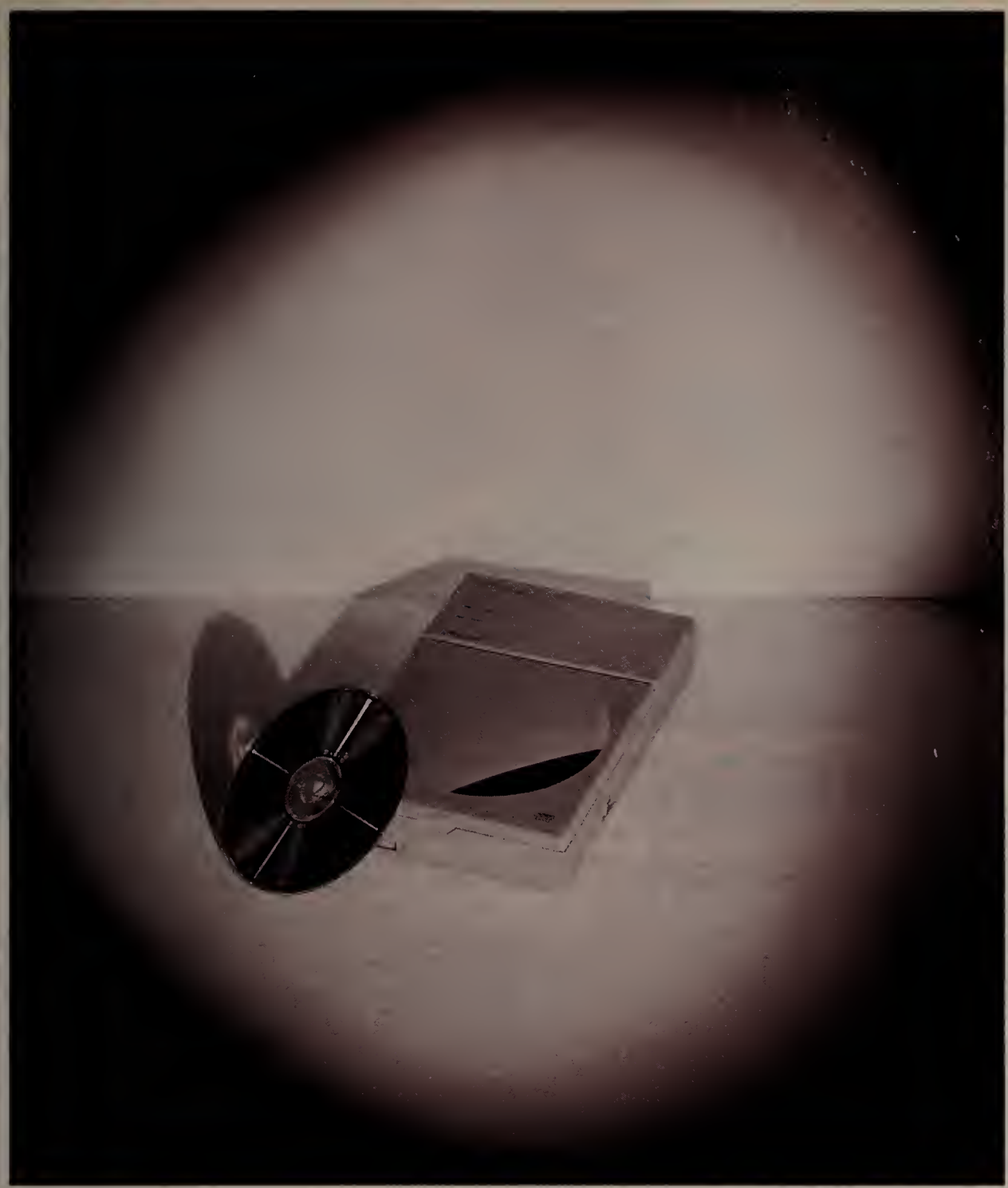

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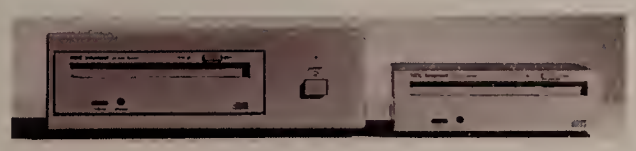

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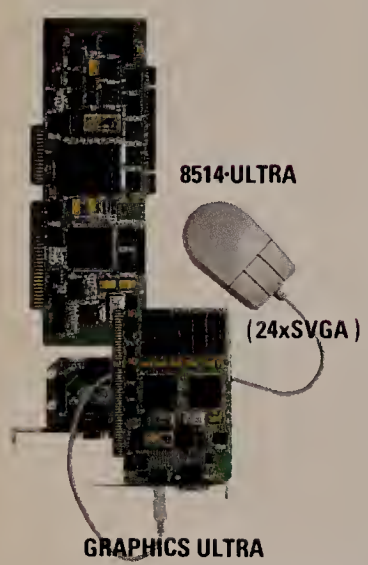

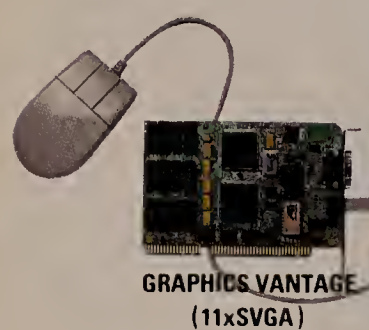

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CONSUMER WATCH

Advice and information for the computer consumer

by Roberta Furger

Shopping for PC Bargains at Office Supply Superstores

With PCs becoming as ubiquitous as copiers, office supply superstores have added PC hardware and software to their already lengthy list of products. But is the store where you buy paper clips and stationery the best place to buy a PC? To answer that question, we sent three computer-savvy shoppers—posing as PC neophytes—to check out the selection and service at three of the leading suppliers.

The Office Club

Pasadena, California

One of the last places I'd think of buying a computer is a no-frills, albeit large, stationery store. I expected to see the usual selection of systems and be greeted by an inadequate sales force. I was right on target when faced with the product line—predictable Packard Bell, Leading Technology, IBM, and a solitary Laser computer. But I was surprised when I talked with Office Club's "Minister of Technology."

I had plenty of time to browse—no one pounced on me when I entered the store. The units were lined up, 286s through 486s, each with a self-running demo on screen. But the displays were incomplete: Some of the computers had a specification sheet taped to them, others simply had a price and model number, making it difficult to compare models or know which monitor went with which computer.

Office Club's computer expert quickly cleared up the confusion. He offered clear, accurate information and good advice. We spent 40 minutes together while I plodded along, asking typical novice questions: What's the difference between an SX and DX? Is 2MB enough? Can I get by with a 286? He was surprisingly patient and unerring with his answers.

I made it clear that I used a computer—an old XT and a dot matrix—but wanted to upgrade and eventually switch to *Windows*. He told me about the various computers Office Club sells, explaining the advantages and disadvantages of each, educating rather than selling. "This system has a 60-watt power supply—not powerful enough," he said, suggesting I stay away from it. All but one of the units were in stock: The store was out of the only 486 they sold, but I was told they would receive a new shipment any day.

The salesman reviewed the software I was using and explained that a 40MB hard disk would be adequate now, but I'd probably run out of space quickly, particularly if I upgraded to *Windows*. He eventually steered me toward a Packard Bell 386SX with 107MB hard disk and 2MB of memory and suggested a Panasonic .28mm dot pitch monitor that would keep me within budget. Since Packard Bell computers are available elsewhere, it was easy to compare prices. Units sold by Office Club were about $100 higher than neighboring discount houses.

Office Club sells popular software names at competitive prices, but the day I shopped, the shelves were barren. They do, however, have a wide selection of peripherals: ribbons, books, mice, disks, cables, and hand scanners. There were also plenty of printers—Okidata, Panasonic and Texas Instruments—but I was able to find only one modem (misplaced near the fax machines).

If only Office Club's computer selection were as broad as its sales force's knowledge, they'd get a lot more of my business. —*Steve Bass*

Staples Office Superstore

Silver Spring, Maryland

The first thing you'll notice when you go into Staples is the well-stocked Egghead Software within the larger superstore. Right off, you know software selection won't be a problem. But from that point on, it's all downhill.

I browsed around the computer equipment section for 10 minutes while two sales clerks ignored me. Since neither offered assistance, I asked one of them for advice. "I see you've got 386s and 386SXs," I began. "What's the difference?" The clerk paused, looking at the feature cards on the units. "I think it must be the hard drive," he said. "The SX has a 40MB drive, and the other one has 80MB."

Somewhat surprised to see a Canon computer, I walked over to investigate. The attached feature card said the machine included 64K of RAM and 1MB of ROM. "What's ROM?" I asked. "Oh, that must be a mistake," the clerk said. "They must mean RAM." Then what, I asked, was the 64K of RAM? He didn't know but went to the back room

ANTHONY RUSSO

to see if he could find out. He returned without an answer.

While the staff's level of knowledge was bad, the selection at Staples was surprisingly good. Besides a large selection of Dells, there was also a lower cost line of Leading Technology computers, an even lower priced line with a "Celebrity" logo, and the single Canon unit. There were five laptops available: two Texas Instruments models and three Toshibas. The store also had a modest selection of four modems, two from Intel and two from Practical Peripherals. There was a single Panasonic laser printer and several Panasonic and Epson dot matrix printers. Finally, there were a few mice, including Logitech's line, and two Boca Research VGA boards.

All of the computers and peripherals were reportedly in stock, with the exception of the Dell System 433P, a 486 that required a special order.

The prices were good. In fact, the Dell System 325P, which includes an 80MB hard drive, 2MB of RAM, *Windows 3.0,* a mouse, and a year's on-site warranty, was on sale for $1900. Dell's mail-order ads list the unit at $1999.

If you know what you're looking for and want the convenience of one-stop shopping, Staples may be the place to go. But first-time buyers should beware: You could wind up purchasing wrong or inadequate equipment if you rely on the sales staff for guidance. —*Patrick Marshall*

Bizmart

Dallas, Texas

I visited Bizmart two days after its computer department reopened and was amazed at the transformation. Bizmart's computer selection used to consist of a small selection of poorly displayed merchandise. Now several brightly lit, smartly colored displays stood as signposts for the supercenter's new and upscale section.

A conservatively dressed salesman offered assistance as soon as I entered. Although he was obviously well versed in PC technology, he never tried to overwhelm me with technobabble or sell me a system that wouldn't meet my needs. Instead, he answered all my questions with patience and accuracy—explaining the benefits of the newer technology, the difference between the SX chip and its more powerful counterparts, and the benefits of *Windows* over DOS.

After I ran through a list of the software I use—and indicated that I wasn't under tight budget constraints—the salesman directed me toward two systems he said would meet my needs: a $1099 Laser 386SX, which came with two floppy drives, a 40MB hard drive, 2MB of RAM, a VGA board, and monitor; and an Acer Acros486Dx-120 model 750, which, for $2799, offered much higher performance and a richer array of built-in features and add-ons. Although he didn't push one unit over

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the other, he did note that the higher model would serve me well as I moved into more complex desktop publishing and graphics applications under *Windows*—not a bad point considering the reasonable price of the 486 system.

When I asked why he showed me the two clones rather than the Compaq or IBM systems on display, the salesperson explained that while Compaq is known for technical excellence, its prices are significantly higher than many of its competitors. He added that I would also wind up paying a hefty premium for an IBM system—and would be tied into buying from Big Blue if I wanted to upgrade later.

Besides the desktop line, Bizmart has a wide selection of laptop and notebook PCs and a full line of Macintosh computers. There's also a reasonable selection of monitors and printers and a rich assortment of peripherals and computer accessories.

I returned to Bizmart a second time. After saying hello, the salesman left me to explore uninterrupted. When I was leaving he suggested that I call or visit other stores for comparison shopping before making a purchase, noting that Bizmart will match or beat a competitor's price on identical items. This clinched the sale for me. —*Paula S. Stone*

Steve Bass is a PC World *contributing editor; Patrick Marshall and Paula S. Stone are freelance writers.*

SHOP TALK

Mail-Order Alert

Complaints continue to come in from people who paid for—but have not received—products from four California mail-order companies that advertised in *PC World* and several other publications between June and December of last year. To date we have received more than four dozen complaints from customers of American Computer Technology (ACT) of Garden Grove, Minuteman Computers of Costa Mesa, One Stop Micro of Van Nuys, and Computer Spectrum of Wilmington. Minuteman and ACT have gone out of business. One Stop Micro and Computer Spectrum appear to be in business, but customers report that phones frequently go unanswered or the lines are constantly busy.

Because these companies have not fulfilled orders that were placed by many customers and have not responded to multiple *PC World* inquiries, *Consumer Watch* has contacted the local police departments and the postal inspector's office. We encourage anyone who has not received an order placed with any of these four companies to do the same. Letters to the postal inspector should be sent to: Regional Chief Inspector's Office, 850 Cherry Ave., San Bruno, CA 94098-0100.

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hear from customers of these companies. If you haven't already done so, please contact us with your experiences.

Stuck in the Middle

I recently purchased an upgrade to MS-DOS 5.0 from Rose Hill Systems and installed it on my computer. I experienced trouble with the memory manager, so I called Rose Hill. Their technical support person couldn't help me but gave me the toll-free number for Microsoft support. I was told this number is good for the first 30 days after the time of purchase.

When I called Microsoft I was told that mine was a so-called modified version of DOS (modified by the manufacturer for its specific computer) and that I would have to get support from that company or call Microsoft's 900 line (a toll number).

Rose Hill's technical support person almost laughed at the idea that they would modify MS-DOS 5.0 for their computers. He told me they get the product and install it on their computers as is. I called Microsoft back. The technician refused to help me and gave me the 900 number to call. In desperation I did, and it cost me $42! And Microsoft had to call me back before they could answer my question.

Scott Crumb
Carson City, Nevada

Editor's note: According to a Microsoft spokesperson, all hardware companies that sell DOS 5.0 are responsible for supporting the product. The 900 number, she added, was installed so users have a way of getting Microsoft support if their hardware company "does a poor job."

Interestingly, if Mr. Crumb had purchased the MS-DOS 5.0 upgrade package, which is marketed directly by Microsoft through retail and mail-order dealers, he would have been eligible for the 30 days of free support.

Shrink-Wrap Protection Ain't What It Used to Be

I went to the Comp USA store in Rockville, Maryland, to buy a copy of Quarterdeck's *QEMM-386*. When I got home and tried to install the software, I was surprised to find that the shrink-wrapped copy I had purchased was licensed to another user.

I called Comp USA and was told there must have been a slipup. The person I spoke with said that when software is returned after being opened, they ask the customer if the program had been installed. If the customer says no, they put on new shrink-wrap and return the package to the shelf. I asked the clerk if they checked returned programs for viruses? The answer was no.

When I returned the copy of *QEMM-386* to Comp USA the next day, I spoke to an assistant manager who told me that returned software goes into one of two stacks: unopened or opened. The opened software is supposed to be

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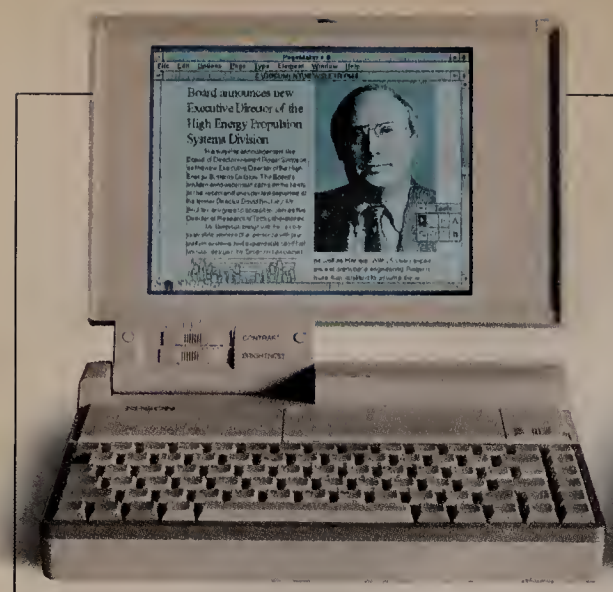

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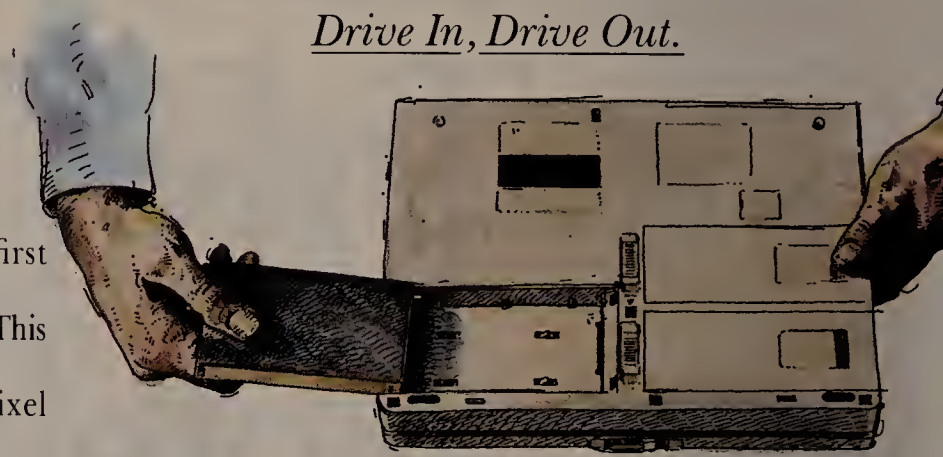

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The possibilities are endless. Using their own removable drives, several employees can share a notebook without sharing data. You can even create a whole library of drives, each with its own type of data, application or operating system.

*NB-SL/25C and color upgrade available second quarter 1992. **Battery life will vary according to use. All company and/or product names are trademarks and/or registered trademarks of their respective manufacturers. Epson is a registered trademark of Seiko Epson Corp. ©1992 Epson America, Inc., 20770 Madrona Ave., Torrance, CA 90509. For dealer referral, call **800-BUY-EPSON** (800-289-3776). In Canada, call 800-GO-EPSON.

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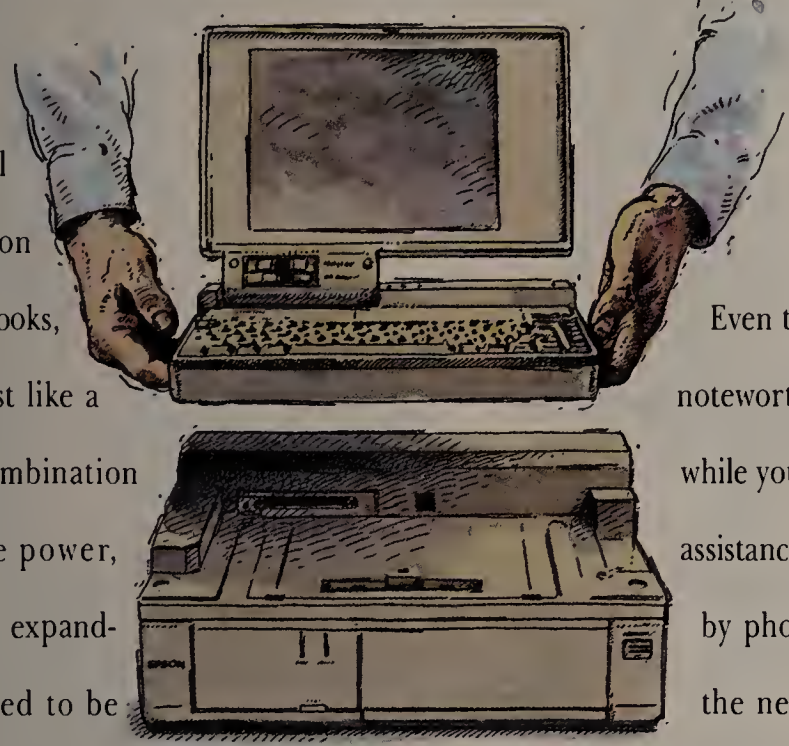

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Even the service and support behind these notebooks is noteworthy. Our unique Extra Care Road Service℠, free while your NB-SL is under warranty, puts expert technical assistance just an 800 number away. Anything we can't fix by phone, we'll fix by mail, by sending a replacement the next day. Pop in your removable hard drive and you're ready to go again, without losing any precious data—or much precious time. It's an extra measure of security that only Epson can provide.

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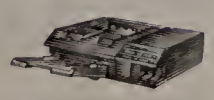

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BUG WATCH

Up-to-date information about hardware and software bugs

Microsoft Windows 3.0 . Logitech mice

The Logitech driver shipped with Microsoft *Windows* is not compatible with any of Logitech's mice, according to a Logitech spokesman. As a result, your cursor may jump around the screen when used under *Windows*. Logitech suggests using either the driver bundled with their mice or the Microsoft Mouse driver in *Windows*, since Logitech guarantees compatibility with Microsoft Mouse. The latter solution, however, will not allow you to take advantage of Logitech's third-button functions.
Logitech
415/795-8500

NetWare Shell

If your office uses the NetWare Shell (NETx), you may discover corrupted files in *WordPerfect*, *1-2-3*, and others. This problem is found in NetWare Shell versions 3.01A through 3.01D and version 3.02A. It can be fixed by obtaining NetWare Shell version 3.22 through your local Novell reseller or by downloading DOSUP4.ZIP from Novell's NetWire BBS. A temporary fix—since it will slow performance—is to stomp out this bug by typing **CACHE BUFFERS = 0** in your SHELL.CFG or NET.CFG.
Novell
800/453-1267, 801/429-7000

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Susan Lusty is an assistant editor at PC World.

checked to make certain it has not been installed. If it has not been installed, it will be rewrapped. Apparently this copy just slipped through, he said.

Patrick Marshall
Rockville, Maryland

Editor's note: According to Paul Ewert, merchandise manager for Comp USA, the company offers a 14-

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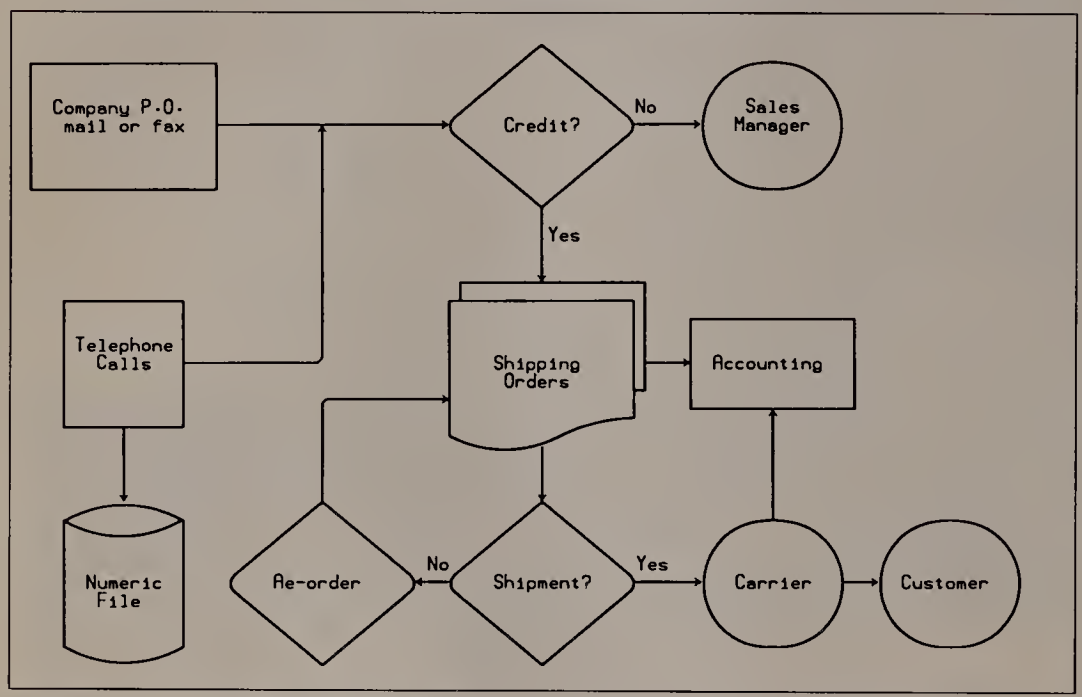

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day return guarantee on all products—no questions asked. The store policy, however, is to return software that has been opened to its distributor for replacement or credit. In-store shrink-wrap machines, said Ewert, are used to repackage "shopworn" packages or those that have been returned with the envelope seal still intact. "If the seal is broken, it's not okay to rewrap," he added.

Although such incidents are not widespread, you might consider taking precautions before installing software. If you're buying from a retail store, ask a salesperson to install the package on a demo system to make sure it hasn't been used. Some salespeople may balk at this (if you're buying at a discount store or through the mail, this won't be an option). If you are security conscious, you can invest in virus detection software and scan new disks for viruses before installing them on your computer's hard disk.

Think you've gotten a raw deal—or a great one? Send the details to Consumer Watch, PC World, *501 Second St. #600, San Francisco, CA 94107; MCI Mail PC World Editorial; CompuServe 74055,412; or 415/442-1891 (fax). We'll investigate and publish letters with the broadest interest.*

POWER TIP NO. 238

Word for Windows Highlights

For quick editing, use *Word for Windows'* highlight-and-type-over method. Highlight the word or passage you want to delete, and start typing new text. *WinWord* clears the highlighted block and inserts the new text in its place.

Paula Moreira
Elizabeth, New Jersey

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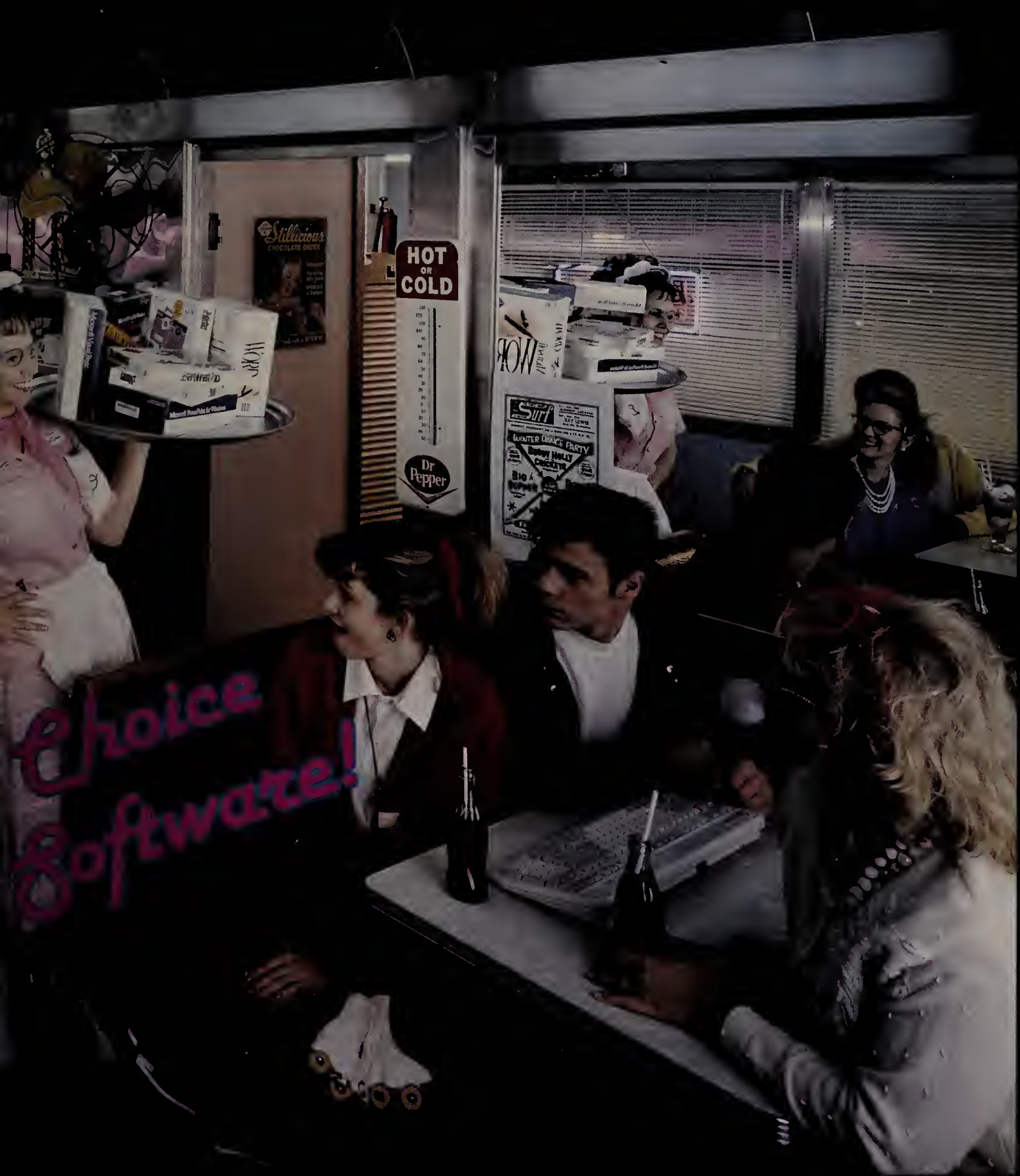

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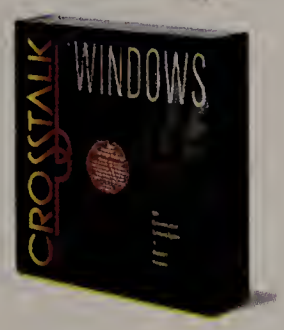

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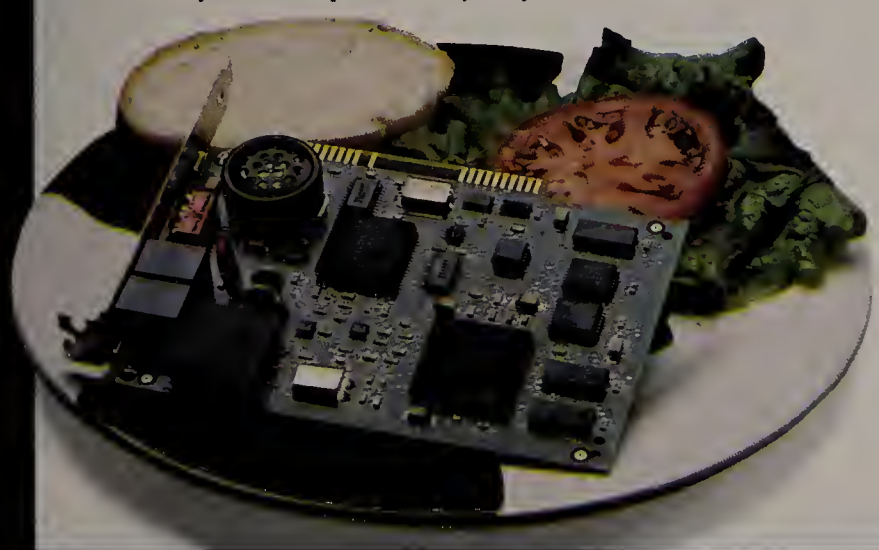
- Fax mode: V.17, V.29, and V.27ter
- Data mode: (try to find one we don't support!) V.32bis, V.32, V.22bis, V.22, V.21, Bell 212A and 103, V.42 and MNP 2-4 error correction, V.42bis/MNP 5 data compression

Price. You'll find comparable fax/modem packages can cost in excess of $500 not including the software. At $195, the Gateway TelePath price is very easy to swallow.



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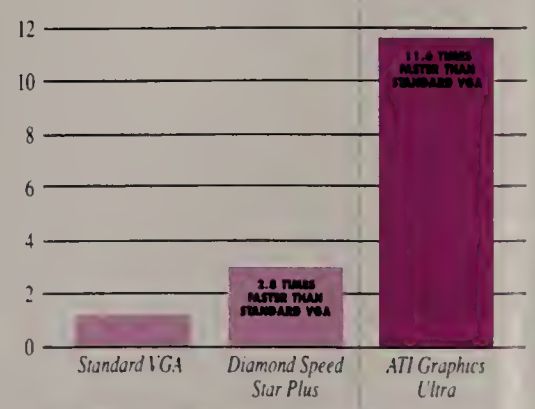
The ATI Graphics Ultra video card is standard with the 486-33 system, optional with 386DX and 486 systems. The street price of this card is over $500, but with the purchase of a Gateway 2000 system, you can upgrade to it for $150!



Figures computed on a 486/33 and provided by ATI Technologies Inc.

Peripherals are sold only with the purchase of a system. If you already own a Gateway 2000 computer, you can buy peripherals separatel

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Desserts

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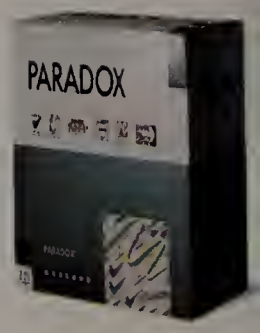

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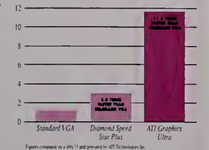

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Retail value: $495. Discount value: $300+. Can be yours free with a Gateway 2000 PC!

Option #2

Microsoft Word for Windows™ 2.0

- Best selling word processor for Windows
- New version 2.0 adds spectacular refinements
- Includes online help for WordPerfect® users

Retail value: $495. Discount value: $300+. Can be yours free with a Gateway 2000 PC!

Option #3

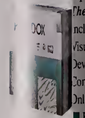
Microsoft PowerPoint for Windows™ 2.0

- Easy-to-use desktop presentations program
- Creates high-quality overheads and 35mm slides

Retail value: $495. Discount value: $300+. Can be yours free with a Gateway 2000 PC!

Option #4

The Paradox® 3.5



- Award-winning database management program
- From Borland,® the leader in database and programming software

Retail value: $695. Discount value: $500+. Can be yours free with a Gateway 2000 PC!

Option #5

The Entrepreneur Pack

Includes Microsoft's Works,™ Publisher™ and Money,™ the latest versions, and an Entertainment Pack, all for Windows, plus TurboTax for Windows® from ChipSoft

- Works integrates a word processor, spreadsheet, database and more into one easy-to-use program
- Publisher has page layout tools to create publications
- Money helps you control your finances by writing checks, setting budgets, tracking expenses
- Entertainment Pack, eight games including Tetris®
- TurboTax is an easy-to-use tax preparation program with online help for understanding IRS rules

Retail value: $607. Discount value: $400+. Can be yours free with a Gateway 2000 PC!

Desserts

Option #6

The Windows Programmer Pack

Includes Microsoft's QuickC for Windows,™ Visual Basic for Windows,™ Windows Control Development Kit,™ MS Windows Help Compiler™ and MS Windows Programmer's Online Reference™

- Everything you need to create programs for Windows

You can't buy all of these tools in one package elsewhere, but this option can be yours free with a Gateway 2000 PC!

Option #7

Microsoft Project for Windows™ 3.0

- Flexible and easy project management program
- Includes interactive online tutorial
- *PC Magazine* calls it the best program in its category

Retail value: $695. Discount value: $425+. Can be yours free with a Gateway 2000 PC!

If the free software packages offered here don't suit your needs, we have others that are very competitively priced. For example, if you'd rather get Microsoft Office,™ which includes Word for Windows, Excel and PowerPoint, you can upgrade to it. Office retails for $750, with a discount value of $499. It can be yours for only $175 with a Gateway 2000 PC. Ask your sales representative for details.

This offer includes the identical applications contained in retail packages but will not include the retail box. You get a complete set of diskettes and manuals, shrink-wrapped and packaged in a Gateway 2000 box.

Main Course

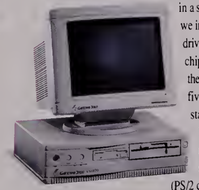
There's A PC Here That's Just What You're Hungry For

Gateway 2000 computer systems – the meat and potatoes of our menu – come with all the trimmings at no extra charge. All systems have plenty of RAM, two diskette drives, fast and reliable hard drives, 16-bit VGA graphics, color monitors and 124-key programmable AnyKey™ keyboard. We use only the highest quality components in our systems. Every model includes MS DOS 5.0, and 386SX, 386DX and 486 models with Windows 3.0 and a Microsoft mouse.

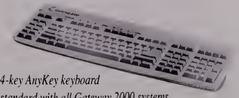
Substitutions are welcome! We custom build each Gateway 2000 system to your specifications.

286 And 386SX Systems

Gateway 2000's 286 and 386SX systems come in a compact mini desktop model. To give you plenty of room for expansion in a small footprint system, we integrated the diskette drive controller, the video chip set and the I/O ca[illegible] the motherboard, leaving five 16-bit slots open in the standard configuration.



The mini desktop models have a standard mouse port (PS/2 compatible), leaving two serial ports open. RAM on these systems is expandable to 16MB on the motherboard. The Western Digital® IDE hard drives feature a 32K read-look-ahead cache buffer. All mini desktop models have Quadtel® BIOS and 200 watt power supplies.

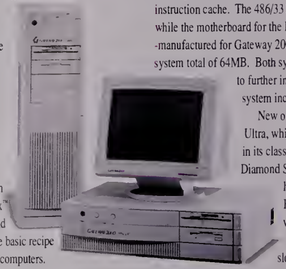


The 124-key AnyKey keyboard comes standard with all Gateway 2000 systems.

Main Course

386DX Systems

The 386 systems have a true 32-bit memory bus and more expansion capability. We start with a genuine Intel® 80386 microprocessor on a Micronics® motherboard. We add a generous portion of RAM – 4MB expandable to a system total of 64MB. Put in 64K of cache RAM on the 386/33 for a nice performance boost. Add IDE hard drives from Western Digital. Then give them Diamond Speedstar Plus™ 16-bit VGA graphics cards with 1MB RAM, non-interlaced 14-inch Crystal Scan 1024 x 768 color monitors, Phoenix® BIOS, a Weitek socket on the 33 and 200 watt power supplies. That's the basic recipe for these tried-and-true, workhorse computers.



Both systems have a 32-bit slot open in the standard configuration for RAM expansion. The motherboard has a total of one 32-bit and seven 16-bit slots, with one 32-bit and five 16-bit expansion slots available in the advertised configuration. Gateway's 386DX and 486 systems come in a desktop model that is roomy and easily accessible. A floor-standing tower model is an option for an additional $100.

486 Systems

Gateway 2000's 486 systems run on the real McCoy – an Intel 80486 processor with built-in math coprocessor and 8K instruction cache. The 486/33 has a Micronics® motherboard, while the motherboard for the EISA system is custom -manufactured for Gateway 2000. RAM is expandable to a system total of 64MB. Both systems also have an external cache to further increase performance: the ISA system includes 64K; the EISA PC has 128K.

New on the 486/33 is the ATI' Graphics Ultra, which is the fastest video card by far in its class. The EISA model includes a Diamond Speedstar Plus, which is also a high-performance video card. Both systems come with 1MB video RAM.

The 486/33 has eight 16-bit slots on the motherboard, six available in the standard configuration. The EISA machine has eight 32-bit EISA slots on the system board. You have five 32-bit EISA slots open in our standard configuration.

The 486/33 has Phoenix BIOS, while the 486/33 EISA uses Award® BIOS. Both systems come with Weitek sockets and 200 watt power supplies.

Please refer to the back page of this ad for system configurations and prices.

Peripherals are sold only with the purchase of a system. If you already own a Gateway 2000 computer, you can buy peripherals separately.

Gateway Cafe

16 MHz 286

- 80286 Processor
- 2MB RAM
- 1.2MB 5.25" Drive
- 1.44MB 3.5" Drive
- 40MB 17ms IDE Drive with 32K Cache
- 16-Bit VGA with 512K
- 14" Crystal Scan 1024 Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 1 PS/2 Mouse Port
- 124-Key AnyKey™ Keyboard
- MS DOS® 5.0

$1345

16 MHz 386SX

- Intel® 80386SX Processor
- 2MB RAM
- 1.2MB 5.25" Drive
- 1.44MB 3.5" Drive
- 40MB 17ms IDE Drive with 32K Cache
- 16-Bit VGA with 512K
- 14" Crystal Scan 1024 Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 1 PS/2 Mouse Port
- 124-Key AnyKey Keyboard
- Microsoft® Mouse
- MS DOS 5.0
- MS Windows™ 3.0
- Choice of Application Software

$1445

20 MHz 386SX

- Intel 80386SX Processor
- 32K Cache RAM
- 4MB RAM
- 1.2MB 5.25" Drive
- 1.44MB 3.5" Drive
- 80MB 17ms IDE Drive with 32K Cache
- 16-Bit VGA with 512K
- 14" Crystal Scan 1024 Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 1 PS/2 Mouse Port
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS DOS 5.0
- MS Windows 3.0
- Choice of Application Software

$1745

25 MHz 386

- Intel 80386 Processor
- 4MB RAM
- 1.2MB 5.25" Drive
- 1.44MB 3.5" Drive
- 80MB 17ms IDE Drive with 32K Cache
- 16-Bit VGA with 1MB
- 14" Crystal Scan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS DOS 5.0
- MS Windows 3.0
- Choice of Application Software

$1895

Best Buys

- Get our 33 MHz 386 system, same configuration as listed, with a 120MB IDE hard drive instead of the 200MB drive.

$2145

- Same features as our 33 MHz 486 system except this machine has 4MB RAM instead of 8, and a 120MB IDE hard drive instead of the 200MB drive in our standard configuration.

$2495

33 MHz 386

- Intel 80386 Processor
- 64K Cache RAM
- 4MB RAM
- 1.2MB 5.25" Drive
- 1.44MB 3.5" Drive
- 200MB 15ms IDE Drive with 64K Multi-Segmented Cache
- 16-Bit VGA with 1MB
- 14" Crystal Scan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS DOS 5.0
- MS Windows 3.0
- Choice of Application Software

$2395

33 MHz 486

- Intel 80486 Processor
- 64K Cache RAM
- 8MB RAM
- 1.2MB 5.25" Drive
- 1.44MB 3.5" Drive
- 200MB 15ms IDE Drive with 64K Multi-Segmented Cache
- ATI Ultra VGA with 1MB
- 14" Crystal Scan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS DOS 5.0
- MS Windows 3.0
- Choice of Application Software

$2945

33 MHz 486 EISA

- Intel 80486 Processor
- 128K Cache RAM
- 8MB RAM
- 1.2MB 5.25" Drive
- 1.44MB 3.5" Drive
- 340MB 15ms SCSI Drive with 128K Multi-Segmented Cache
- 32-Bit EISA SCSI Controller
- 16-Bit VGA with 1MB
- 14" Crystal Scan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS DOS 5.0
- MS Windows 3.0
- Choice of Application Software

$3895

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Edited by ERIC BENDER

Buyers Applaud Ease of Learning and Use

"Light" Software: Satisfying, Less Filling

Inexpensive Packages Target Individual Customers

Sverdrup's Gerald Walker says Quattro SE offers disk space and price advantages over Quattro Pro, but remains fully compatible.

GERRY GROPP

Software makers have seen the light. Borland's *Quattro SE* and *Paradox SE*, *Lotus Write*, Microrim's *R:base Personal*, and Micrografx's *Windows Draw* recently introduced "light" versions of heavyweight applications, with slimmer features and prices.

And customers like the results.

Gerald Walker, a project manager with Sverdrup Corporation in Walnut Creek, California, sums up the main reasons for buying *Quattro SE*: "Disk space, compatibility, and price."

"I've got only 20MB [of storage] on my portable, and I don't use anywhere near the total features of the full program," says Walker. His solution is to use the less disk-hungry *SE* version on his laptop and his home computer. "The only things I notice missing in *SE* are WYSIWYG and some of the printing options," says Walker. For those, Walker keeps the full version of *Quattro Pro* on his office machine.

"We're trying to make sure we're legal everywhere here," adds Walker, "and *SE* sure helps." Listing for only $69.95 rather than *Quattro Pro*'s $495, "*Quattro SE* makes it easy to be legal."

Different Strokes for...

While light packages sometimes end up being used in corporations like Sverdrup, their main targets are users in small businesses and in the home. These packages are often sold by superstores or mass merchants or come bundled with PCs.

It makes sense that this software is arriving in force as the number of casual PC users climbs, notes Tom Miller, analyst with Link Resources in New York. "The most compelling underlying reason for light programs," says Miller, "is that most people use only 10 percent of an application."

The recent wave of light programs, says Miller, reflects software makers' belief that they can profit by splitting their markets. The basic packages can be sold at a discount to personal and small-business users, while the full-featured versions are sold at a premium to corporate and power users.

It's Not Only Price

But for many buyers, ease of use is even more important than price. That concern, at least, was paramount in Mark Skodorwa's decision to buy *R:base Personal*, a $99 version of Microrim's $795 *R:base*.

"I don't have a lot of time to play with software, so I needed something I could get up and running quickly," says Skodorwa, a sales representative for Hewlett-Packard in Toronto. Learning *R:base Personal* "was nowhere near as tough as I thought it would be. And it's done everything I want it to do." He's even tempted to take advantage of Microrim's upgrade policy to try the full version of *R:base*. "But I'm not here to be a computer programmer," he says.

Ease of learning and use were also critical in Greg Friedman's decision to buy Micrografx's *Windows Draw* for Southern California Edison, where Friedman is manager of the *Windows* transition group. *Windows Draw* "is full featured and has a nice interface," says Friedman.

He formerly used *Micrografx Designer* but found it too complex for his needs: "I got lost in the features." *Draw*, on the other hand, "is for the person who uses it occasionally, every month or two, as well as for the person who uses it every day," he says. And yes, *Draw* lists at $149.95, compared to $695 for *Designer*. —*Patrick Marshall*

Going "Light" Saves Dollars, Difficulties

Selected low-end versions of major applications

Regular	Light	Features Omitted From Light
Ami Pro, $495	Lotus Write, $199	Drawing, charting, tables, revision marking, indexing
Micrografx Designer, $695	Windows Draw, $150	Multiple layers, auto-tracing, auto-scaling, auto-dimensioning
R:base, $795	R:base Personal, $99	Programming language, network support, passwords, backup
Quattro Pro, $495	Quattro SE, $70	WYSIWYG interface, advanced printing, network support

A new crop of inexpensive low-end applications from major suppliers offers all the functionality that many users need.

Mail-Order Companies Branch Out

Stiff Competition Demands New Product Strategies

When you sell PCs over the phone, you've got to do something to distance yourself from your rivals. Just ask Craig Dwayne, president of PC Pros/Touche, a small mail-order firm in Darien, Illinois, that offers a free 386SX PC with every purchase of a 486 system. "It's not a gimmick," insists Dwayne, who expects a soft economy and cutthroat competition to keep slashing away at PC prices. "At the end of the year, you'll see 486SX systems at $999."

His ACT Business Center—combining notebook, printer, fax-modem, cellular phone, and printer—keeps Mike Creach in touch with his clients.

BRAD BOWER

Rock-bottom prices and increased competition are forcing major PC mail-order companies like CompuAdd, Dell, Gateway 2000, Northgate, and Zeos to develop new marketing twists and product strategies.

Although the percentage of PC hardware sold via mail is still small, it has been growing steadily in recent years—from 4.3 percent in 1987 to 6.2 percent in 1991, according to figures from International Data Corporation.

This distribution channel will become "one of the hottest battlegrounds for PC hard ware vendors," says analyst Frank Michnoff of the Meta Group in Westport, Connecticut. Michnoff expects IBM and Compaq—which both announced belt-tightening measures in 1991—to begin selling PCs direct this year.

Differing Direct Routes

Having built a reputation for quality products and reliable support, Dell Computer posted record sales and profits last year in what was a dismal PC market. And Dell's not backing away from aggressive pricing—in December the company introduced three 486 PCs with prices starting at $2000 and reduced the costs of many of its desktop and notebook PCs.

In addition, this year Dell is starting same-day support (for an additional fee). It's also following the lead of fellow mail-order marketer Northgate by offering packaged NetWare LANs with all the required hardware. Dell has been the pioneer of mail order, says Dan Ness of Computer Intelligence in La Jolla, California. "But now it's having to change its role from guerilla offense to defense."

Another new frontier is the bundling of existing computer products into packages designed for vertical applications. Automated Computer Technology of Houston last year introduced its ACT Business Center, a 20-pound briefcase packed with notebook computer, fax-modem, cellular telephone, and portable printer. The Business Center targets traveling executives, police officers, field salespeople—anybody who needs anytime/anywhere communications on the road.

Mike Creach, owner of Century Business Systems in Bay Head, New Jersey, sells computer systems to churches. He uses his ACT Business Center to keep in touch with clients while on the road. "I can be doing training or sales work at a particular church and have another client call me," Creach says. "I have access to their computer, their data base, their problem."

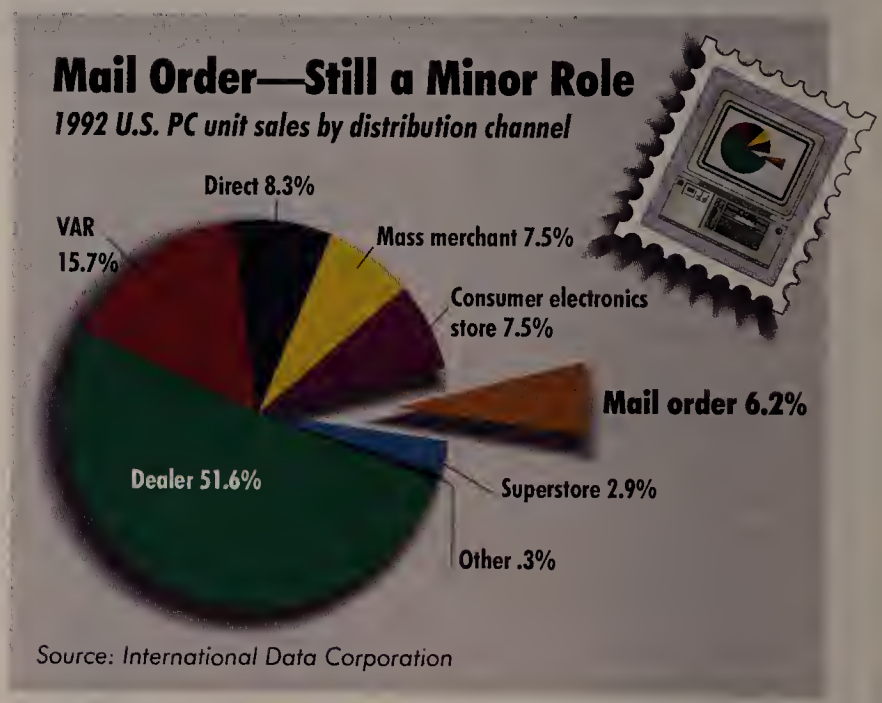
More Bang, Fewer Bucks

CompuAdd is hitting both ends of the customer spectrum. In recent months it won a billion-dollar contract to supply PCs, software, and support to the Defense Department (working with systems integrator Sysorex Information Systems of Falls Church, Virginia). It also created a new subsidiary, CompuAdd Express, which will sell inexpensive PCs to single users and small businesses.

"It's very difficult to compete," says Rick Apple, marketing vice president at Zeos Int'l, another direct-sale manufacturer, "because we're not the cheapest and we're never going to be."

Zeos aims to differentiate itself from the pack by highlighting product quality and support. Apple says "we spend a lot of time talking about the hardware and the unique features we offer," including high-speed memory, dual cooling fans, and motherboards that are designed and manufactured in-house.

Increased competition should continue to push PC prices down. For buyers, the tricky part will be making sure they're buying from a reputable and solvent company. "The guys who do nothing but screw parts together are going to have a hard time," says Apple. —*Jeff Bertolucci*



While mail-order sales of PCs are growing, they represent a relatively small portion of total PC shipments.

LOGICAL PRINTER SHARING

Justification

If one user prints 40 pages a day on an 8 page per minute laser printer, that printer will be in use for only 5 minutes per day! Logical Connections allow several users to easily share expensive printers and other resources, like modems and plotters. Choose the peripheral that you need from a pop-up menu.

If your company has a LAN, use Logical Connections for local printer sharing in smaller workgroups, rather than printing centrally through the LAN. Local printing is more convenient and more secure!

- **Made in the USA**
- **UL Listed Power Supplies**
- **FCC Class B Certification**
  (FCC Class A – LC Jr. with unshielded cables)
- **Available from Local Dealers**
- **Fast Data Input and Throughput**
- **Socketed DRAM Upgrades to 1Mb**
- **Largest Selling PSDs in the USA**

Versatility *LC Plus – 512Kb* $595

All six ports of the Logical Connection Plus are automatically configured as parallel or serial, and input or output. Installation is a breeze. You just plug in your cables and run the installation software; the LC Plus will do the rest. Besides being very user friendly, the LC Plus processes data at blazing speed for any application. You can share modems and transfer files at 115,200 bps.

6 PCs or Printers/Any Combination

Practicality *LC – 256Kb* $395

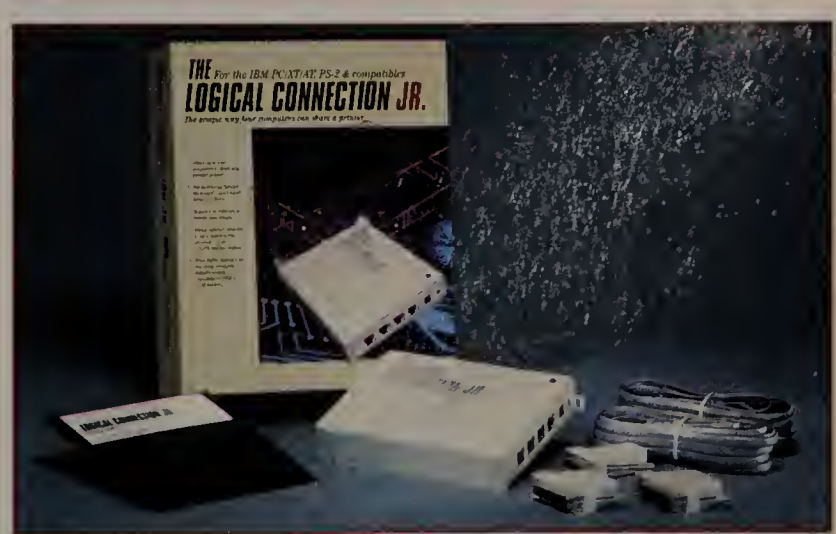
The original Logical Connection is still all the printer sharing device that most people need. The LC is ideal for printing of word processing and occasional graphics data. Its eight ports are: four bi-directional serial ports which can be set as input or output, two parallel inputs and two parallel outputs. Six users can share two parallel printers. The serial ports can also share modems.

6 PCs to 2 Printers (Typical)

Simplicity *LC Jr. – 256Kb* $239

Inexpensive modular cable, even hundreds of feet in length, can be used to serially connect up to four PCs to the Logical Connection Jr. at speeds up to 115,200 bps. Plug your existing parallel printer cable into the LC Jr. and it will automatically convert the data from serial to parallel for fast parallel printing. Multiple users can send data simultaneously since the memory will buffer and queue jobs on a first-in-first-out basis.

4 PCs to 1 Printer



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Circle 126 on reader service card

Windows Slowly Opens Communications

Performance Remains a Key Concern in Shift from DOS

Late this spring when *Procomm Plus for Windows* debuts, PC users will finally be able to choose from a menu of powerful *Windows* communications products. But the jury is out on whether they will take the trouble—and the expense—to switch from character-based DOS packages anytime soon.

This product migration "is happening only gradually, with users tending to merely upgrade to the *Windows* version of the package that they are already using," says Bill Higgs, vice president at InfoCorp, located in Santa Clara, California.

Using the friendly but powerful script language in Future Soft's DynaComm, Dupont's Bill Bailey writes Windows front ends for corporate data bases.

DONNA BISE

Users also are wary of the performance hit that communications links suffer in *Windows*. The combination of *Windows'* inflexible multitasking and the handicapped communications ports found in most PCs can hold transmissions way below the 19,200-baud maximum—and some vendors claim you may lose data.

"Anyone who has paid the bucks for a high-speed modem is going to be disappointed with existing packages," says Matt Gray, president of Hilgraeve in Monroe, Michigan, which plans to ship its *HyperAccess for Windows* by midyear.

Moreover, as electronic mail packages proliferate, fewer users need to purchase a separate application.

"I don't think you are going to get a corporatewide movement to these *Windows* communications packages, because so many other sophisticated options are becoming available," says David Marshak of Patricia Seybold's Office Computing Group in Boston. "People in corporations are increasingly hooked onto networks and use electronic mail packages and gateways to communicate to other systems."

Leaders Haven't Opened Windows

The DOS communications market is dominated by Data Storm Technologies's *Procomm Plus*, followed by DCA's *Crosstalk* and Hayes's *Smartcom*, according to InfoCorp. Only *Crosstalk* also offers a *Windows* version.

However, *Procomm Plus for Windows* will be announced shortly, according to Phil James, manager of product development at DataStorm in Columbia, Missouri.

James says the product won't suffer in performance and will have all the features of the character-based version, along with enhancements such as the capability to view GIF graphics files as they are being downloaded and much more robust keyboard mapping tools (for emulating a mainframe or minicomputer terminal).

Wanted: Ease of Use

Customers say that icon-oriented *Windows* packages can boost ease of use—both in cutting from and pasting text to on-line sessions and, more important, in writing log-on scripts.

Bill Bailey, an engineering manager for Dupont's Fibers Engineering Support Group in Charlotte, North Carolina, has been using *DynaComm* from Future Soft in Houston, Texas, for more than three years. He stays with *DynaComm* because of its easy-to-use yet sophisticated script language.

"It enables a nonprogrammer like me to quickly develop *Windows* front ends [for] data bases on our corporate VAX network," he says. "The scripting language has over 400 commands and supports all the standard *Windows* elements like list boxes, push buttons, and dialog boxes." Bailey exploits *DynaComm* to dial up and scan mainframe reports automatically and then drop numbers into *Excel* spreadsheets.

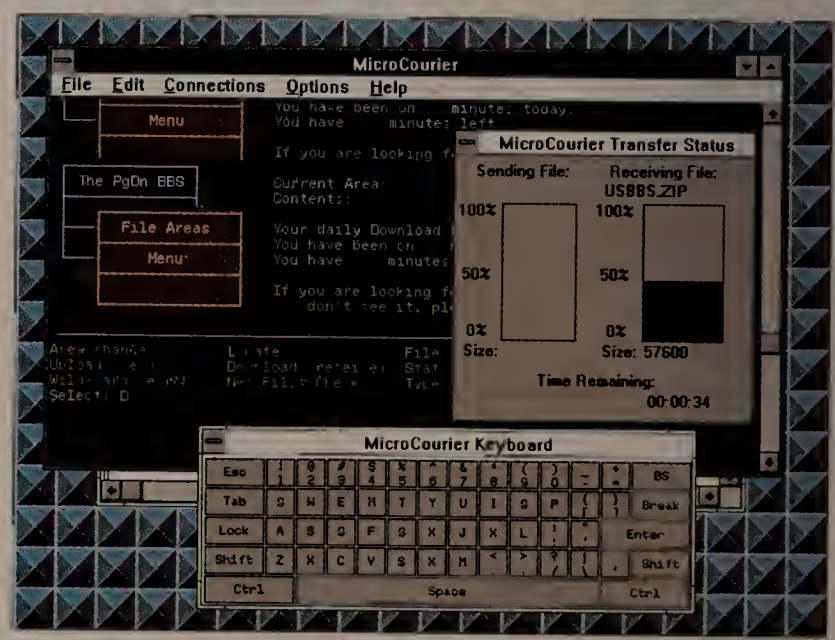
Mike Ullman, a technology consultant with Rockwell Int'l in Seal Beach, California, says his firm standardized on *Procomm Plus* but then switched to *Microphone II* from Software Ventures of Berkeley, California, because Data Storm was late getting its *Windows* version out. "We were happy with *Procomm Plus*, but it was outdated when we moved to *Windows*."

Ullman says the other communications products he tried were a "little too complicated for our average user" but that "*Microphone II* scripting is incredibly easy."

However, *Microphone*'s lack of keyboard mapping features can be frustrating for some users. Ullman hopes eventually to have a product that combines the best of both worlds: ease of use plus all the functionality he needs.

—*Alice LaPlante*

Alice LaPlante is a freelance writer in Palo Alto, California, and Patrick Marshall is a freelance writer in Silver Spring, Maryland.



Listing at $99, Microcom's MicroCourier is a leader in offering full-blown Windows communications at an inexpensive price.

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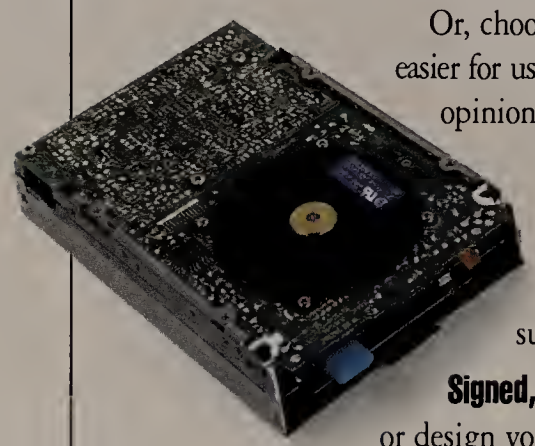

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DECpc 333c

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Microprocessor:	Intel i386 running at 33MHz
Memory:	4MB, 80NS Memory Kit
Storage:	52MB IDE Hard Disk Drive
Resolution Mode:	1024 X 768 SVGA Adapter
Display:	14″ SVGA Color Monitor
Keyboard:	101-key Keyboard
Mouse:	Mouse
Operating Systems:	MS-DOS 5.0 and MS-Windows 3.0

Special Package Price **$3,199**
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DECpc 433 workstation

Includes:

Microprocessor:	Intel i486 running at 33MHz
Memory:	8MB, 80NS Memory Kit
Storage:	40MB IDE Hard Disk Drive
Resolution Mode:	1280 X 1024 TIGA Adapter
Display:	20″ Color SVGA Monitor
Keyboard:	101-key Keyboard
Mouse:	Three-button Logitech mouse
Operating Systems:	MS-DOS 5.0 and MS-Windows 3.0

Special Package Price **$5,999**
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THE PACKS.

DECpc 316sx

Includes:

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Storage:	52MB IDE Hard Disk Drive
Resolution Mode:	1024 X 768 SVGA Adapter
Display:	14″ VGA Color Plus Monitor
Keyboard:	101-key Keyboard
Mouse:	Two-button mouse
Operating Systems:	MS-DOS 5.0 and MS-Windows 3.0

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Includes:

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Microprocessor:	Intel i486 running at 33MHz
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Office Telephone No. _____ Your FAX No. _____

If you have an idea of the PC specs you need, just jot them down in the blanks provided and we'll recommend a system that's right for you.

☐ Here are my specs. Now call me with my new system recommendation.

_____

_____

_____

Customization Worksheet

Your base system is a: ☐ 286 ☐ 386 ☐ 486 ☐ Other

How many applications will your PC(s) run in a typical workday? _____

What best describes the type of work the system will be used for? (Check all that apply):

☐ Word Processing
☐ Order-entry
☐ Database (filing records)
☐ Financial Calculations
☐ Retail Store Management
☐ Desktop Publishing
☐ Education
☐ Design (CAD/CAM)
☐ Engineering
☐ Industrial Process Control
☐ Scientific Research
☐ Software Development
☐ E-Mail
☐ Other industry-specific applications (please specify)

How many people work in your group, department or small business?
☐ Less than 10 ☐ 10-20 ☐ 20-35 ☐ More

Is your operating system:
☐ DOS ☐ DOS with Windows ☐ OS/2 ☐ MAC ☐ UNIX™ ☐ Other

Questions:

Which of the following graphics-oriented applications best describes your needs? (Check all that apply)

☐ Desktop Publishing
☐ CAD/CAM
☐ Realtime Modeling
☐ Animation
☐ Image Processing
☐ AutoCad
☐ Business Graphics

LAN Manager

How many PCs do you have installed? _____ From how many manufacturers? _____

What kinds of connections does your PC(s) require? (Check all that apply)

☐ Links with other PCs in the immediate surroundings
☐ Connection to the local area network (LAN) throughout a building
☐ A line to a host system in a remote location

What kind of media (cable) is used in your LANs today? _____

What is the networking software now being used in your company? _____

What kind of host system will your PC communicate with?
☐ DEC ☐ IBM ☐ Other _____

What Kind of Service Do You Really Need?

☐ On-site Hardware Support ☐ Software Support ☐ Telephone Support
☐ Training ☐ FAX Hotline

How many of your users take portables on the road? _____

Do you currently have a service contract(s) for your PCs? ☐ How many? _____

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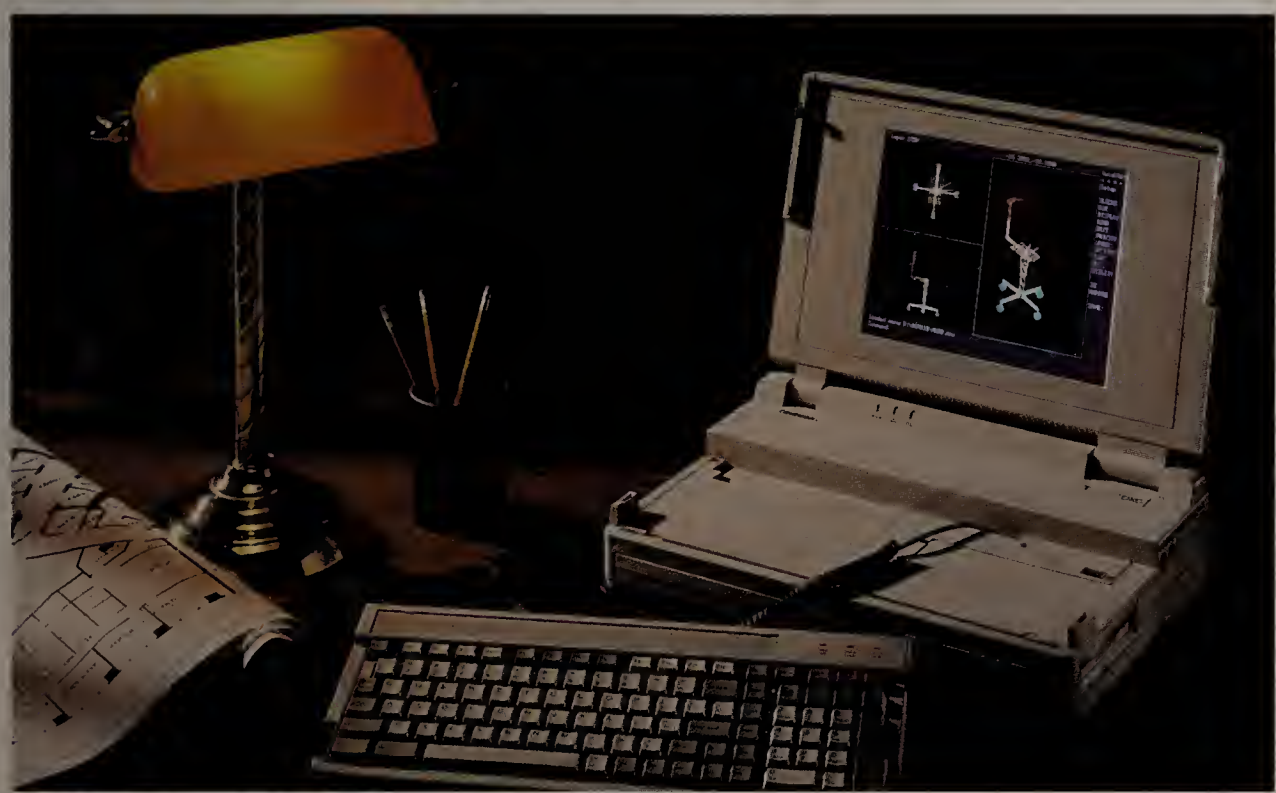
T6400: Toshiba's Big Gun

Terrific color and 486 processing power make this relatively light clamshell a high-powered portable.



Toshiba takes a little weight off your shoulders without sacrificing color, speed, or storage.

by Mike Hogan

If you're a traveling desktop presenter or CAD aficionado often found walking through airports hauling a garment bag, briefcase, and color laptop, you have to ask yourself one question: Do I really feel this strong?

If the answer is yes, you may be man or woman enough to travel with Compaq's 18-pound 486c active-matrix color lunch box (see Preview, January 1992). Otherwise, you'll be happy to hear that Toshiba's T6400 packs much the same functionality into a 13-pound clamshell, and nobody will know from the quality of your presentation that you wimped out.

At 15.4 by 10.5 by 4.1 inches, the T6400 couldn't be called a slimline—in fact, it's just an inch or two smaller than the Compaq. But that's enough to ensure that the T6400 will fit comfortably under your airplane seat. Otherwise they're a close match.

The centerpiece of both AC-powered units is a variation of Sharp Electronics' beautiful, 10.4-inch, active- matrix liquid crystal display. Although the T6400's 256 colors at 640 by 480 resolution come off a smaller palette than the 486c offers, you won't notice any difference in contrast or color saturation. You also get the same incredibly wide horizontal viewing angle characteristic of Sharp's screen—one far wider than any CRT.

You're almost sure to prefer active-matrix color over a CRT because it's produced by bonding almost a million transistors right onto the glass. Three transistors at each pixel provide the ultimate in color control.

Packing a Punch

The T6400 also packs the wallop of a 33-MHz 486 CPU backed up by 8K of internal cache, ideal for compute-intensive applications. That's rounded out by 4MB of memory, expandable via IC cards to 20MB—which is more than you're ever likely to need on the road.

Your choice of 120MB and 200MB hard drives gives you enough room for large CAD files, while a single, 16-bit, AT-type slot and a 150-pin connector provide access to third-party storage and other expansion devices.

Suffice to say that either Toshiba's T6400 or Compaq's 486c give you enough processing power, memory, and storage to rip through any data base query or CAD redraw you can throw at them. It all comes down to a question of how much computer you like to carry.

Mike Hogan is a senior editor for PC World.

SNAPSHOT

T6400

Active-matrix color and maximum processing power and storage are squeezed into the lightest package yet.

KEY FEATURES

- **Active-matrix color LCD**
- **VGA resolution with 256 colors from a palette of 512**
- **Choice of 33-MHz 486DX or upgradable 25-MHz 486SX processor**
- **19ms 120MB or 12ms 200MB hard drive**

AVAILABILITY

January

PRICING

T6400DXC with 33-MHz 486DX, 12ms 200MB hard drive $9749; T6400SXC with 25-MHz 486SX, 19ms 120MB hard drive $8449; T6400DX with gas-plasma display, 33-MHz 486DX, 12ms 200MB hard drive $6999; T6400SX with gas plasma display 25-MHz 486SX, 19ms 120MB hard drive $5699

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FreeHand Draws Applause

FreeHand proves it was worth the wait by providing some of the sharpest drawing capabilities this side of the Mac.

Aldus FreeHand 3.0's Blend dialog box allows you to change the number of steps in an existing graduated color. You may also reshape the first or last object in a blend and change its colors.

by Deke McClelland

Long one of the most popular draw programs for the Macintosh, *Aldus FreeHand* has finally made its *Windows* debut. With precise drawing tools, consummate type control, and other ultimates in high-end drawing technology, it's sure to lure many professional artists away from industry leader *Corel Draw.*

As far as a pure drawing experience is concerned, *FreeHand* is a pleasure. *FreeHand*'s five drawing tools—free-form, pen, curve, corner, and connector—make it easy to draw complicated shapes correctly the first time around, unlike *Corel Draw*'s which typically require you to approximate a curve and then go back and reshape it. *FreeHand* also lets you precisely position a point or Bézier control handle by entering its page coordinates accurate to one ten-thousandths of a point.

For the type enthusiast or logo designer, *FreeHand* may well become the application of choice. While *FreeHand* can't match *Corel Draw*'s extensive collection of typefaces, it's better at dealing with the PostScript fonts that dominate high-resolution typesetting. Unlike *Corel Draw*, which requires you to convert PostScript fonts to its native WFN format before applying special effects, *FreeHand* lets you manipulate PostScript font outlines directly.

If you like to dabble where no draw software has gone before, *FreeHand* offers a load of unique features. Like *Arts & Letters* and *Corel Draw*, *FreeHand* lets you transmute shapes and graduate colors using a Blend command. But unlike either of those programs, *FreeHand* lets you edit the blend after the fact by adding or subtracting steps or editing the outlines or colors of the first and last shapes. *FreeHand* also provides a straightforward masking feature and a composite path feature that enables a background to show through an object. If you want to combine drawings with photographic scans, *FreeHand* lets you import 24-bit color bit maps. Print professionals will appreciate *FreeHand*'s capability to color separate CMYK TIFF images as well as those stored in the desktop color separation (DCS) format.

A Professional's Tool Kit

With *FreeHand*, everything you need to get to work is at your fingertips. You can draw in the preview mode, create text directly on the page, and open multiple documents. And because *FreeHand* provides access to colors, drawing layers, and other graphic attributes via convenient floating palettes, you can change the color of an outline or the interior of a shape by simply clicking an on-screen option. You can also create, rename, hide, and juggle layers on the fly.

Borrowing an idea from the word processor and desktop publishing world, *FreeHand* has come up with *graphic styles*, the graphic equivalent of style sheets. You can assign a name to a collection of attributes—line weights, gradient fills, dash patterns, and so on—then replicate these attributes or transfer styles to other illustrations later.

Best of all, *FreeHand* is the only application that lets you undo up to 99 consecutive operations and then redo any or all of them in sequential order. This is an enormous bonus not only to beginners frustrated by the sheer quantity of their mistakes, but also to experienced users who wish to trace through a series of actions to demonstrate an artistic process or locate a pivotal operation.

Despite all the goodies packed into it, *FreeHand* is still surprisingly easy to use. Its sheer density of features, however, probably makes it more appropriate for professionals than for weekend artists. For example, *FreeHand*'s hardware requirements have more in common with those of the behemoths *Micrografx Designer* and *Arts & Letters* than with the svelte *Corel Draw*'s. Though *FreeHand* will run on an AT equipped with 2MB of RAM, it's painfully slow on anything short of a 386 with 4MB. But if you've yearned for a dependable program with a wide range of capabilities, *FreeHand* deserves a long look.

Deke McClelland is the author of Mastering Aldus Freehand, Windows Version 3.0, *due in April 1992 from Business 1 Irwin, Homewood, Illinois.*

SNAPSHOT

Aldus FreeHand 3.0 for Windows

WINDOWS *Aldus FreeHand may be the first Windows draw program to give Corel Draw a serious run for its money.*

KEY FEATURES

- **Draw and edit objects in preview mode**
- **Advanced type controls**
- **Graphic styles permit consistent application of lines and fills**
- **Up to 99 consecutive undos and redos**

AVAILABILITY

Immediate

PRICING

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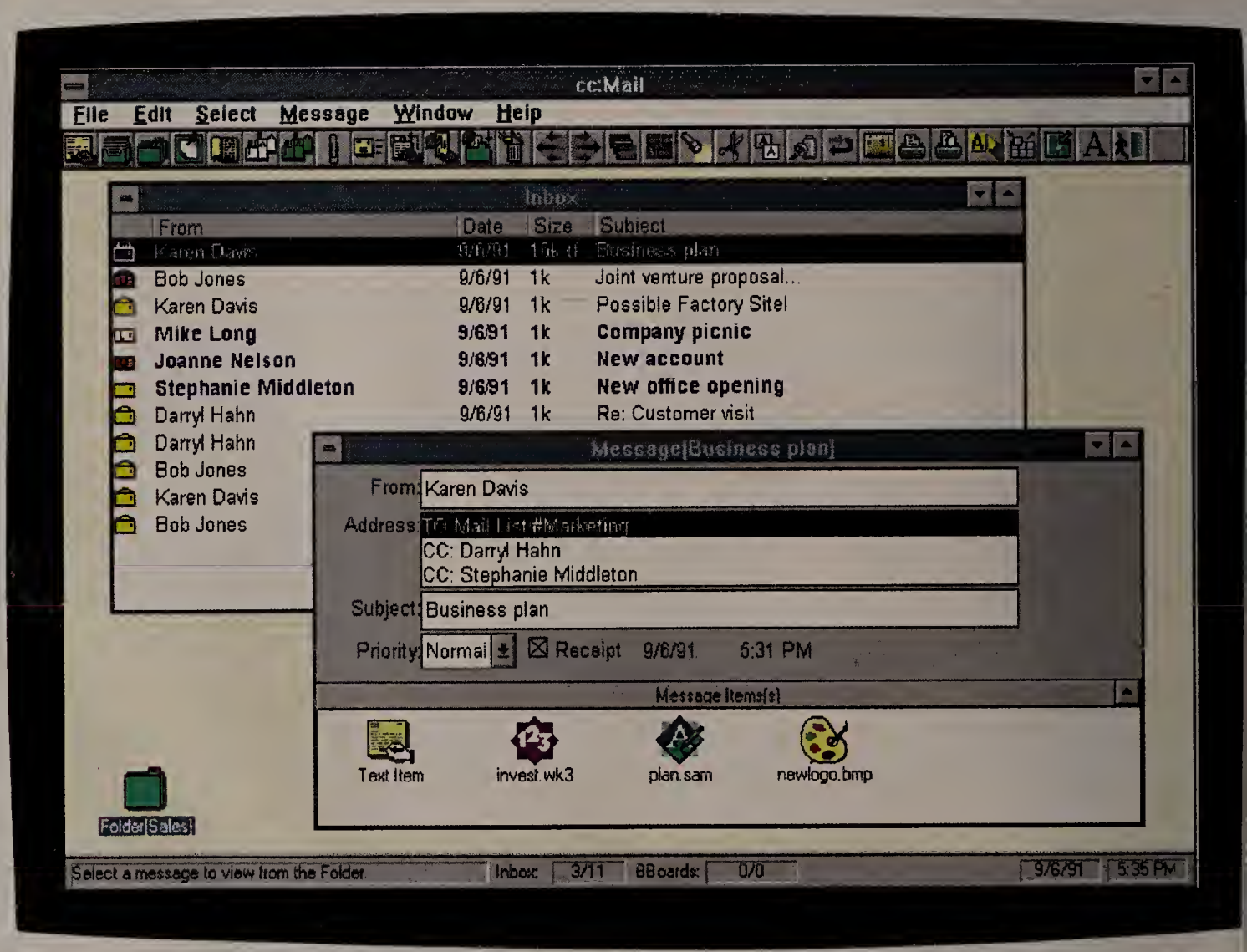

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LAN TIMES READERS CHOICE 1990 1991

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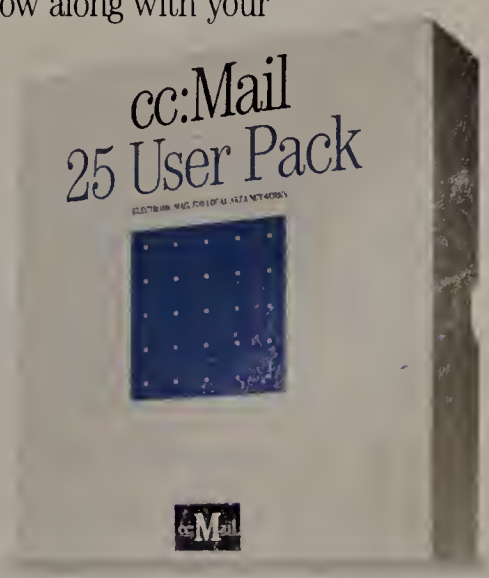

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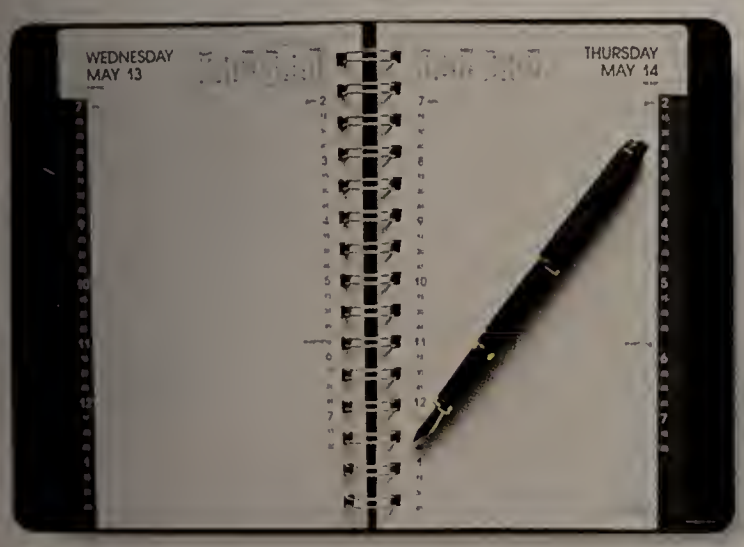

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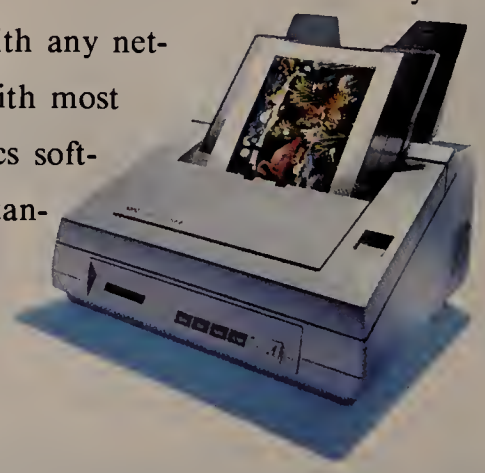

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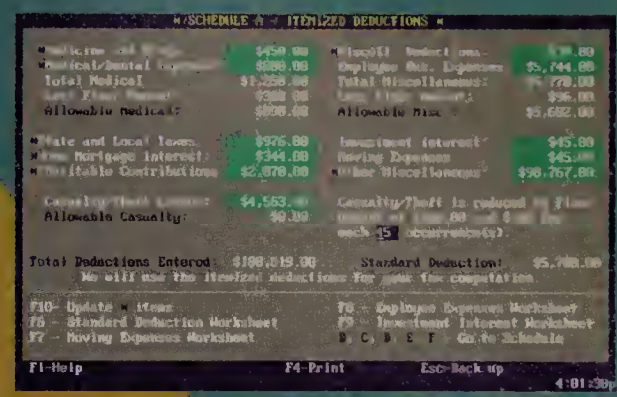

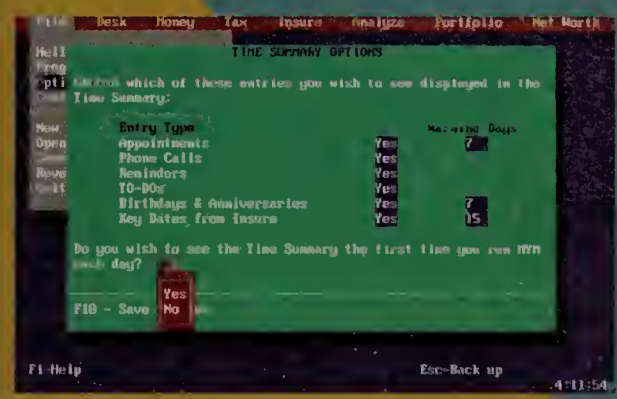

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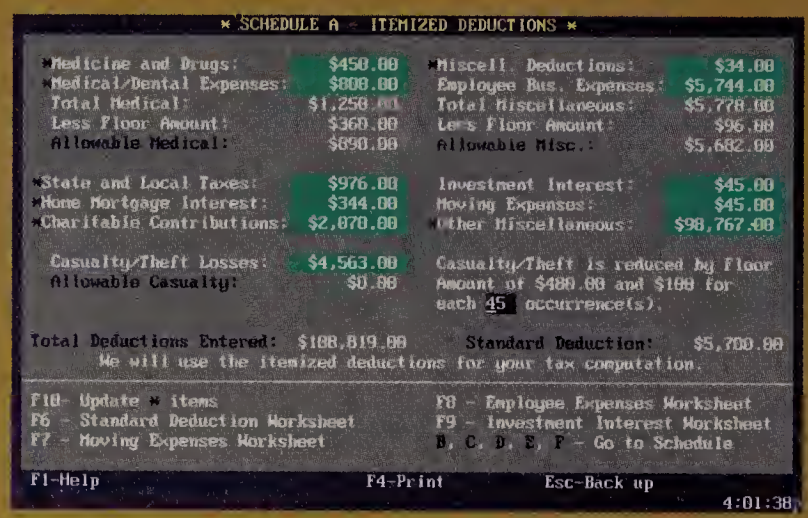

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see Other Side for Details

Edited by RUSSELL GLITMAN

Canon BJC-800

Color Reporting: Canon Comes in Range

Canon's color printer can help keep your business running in the black with compelling presentations, but it will take some green.

Featuring crisp 360-dpi resolution, speedy 300-cps output in draft mode, and a separate ink cartridge for true blacks, the pricey Canon BJC-800 is the Mercedes Benz of color ink jet printers.

Lay a 20-page proposal with gorgeous color charts next to the usual black-and-white ones, and you begin to get the idea: Color increases audience response. In fact, a color printer makes bottom-line sense for almost any work group that produces lots of reports or presentations.

All you need for in-house presentations is a color ink jet printer. For these jobs, you can generally do without the high print quality of a $7000 thermal transfer unit and get the next best thing with Canon's new BJC-800 bubble jet printer. At $2795 list, it is one of the most expensive printers in its class (ink jets go for as little as $1000). At that price, the company claims, you'll get better, faster output than with any other ink jet.

Canon credits this high performance to its bubble jet technology, which it claims permits much finer resolution than traditional ink jets. The BJC-800 uses four ink cartridges—black, cyan, magenta, and yellow—each attached to an individual printhead that has 64 nozzles.

Canon claims this technology produces finer ink droplets, resulting in a more precise application of ink than with other ink jets.

As the ink makes its way through the nozzle, it is heated to the boiling point. The resulting pressure forces the ink out of the nozzle in a very fine pulse—hence the term "bubble jet."

The Canon BJC-800 boasts several other design advantages. First, the separate black cartridge gives you true blacks. This produces sharper text than that of the processed blacks you get from three-cartridge printers.

Second, the 64 nozzles produce superior 360-dot-per-inch resolution, meaning sharper lines, better color saturation, and crisper text than from most ink jets, which commonly provide 180 to 300 dpi.

Third, you get speedy output—300 characters per second in draft mode compared with 200- to 250-cps draft for other ink jets.

The BJC-800 will print on plain paper, but Canon suggests its own coated stock for best results. The multipurpose paper tray can accommodate letter, legal, and ledger paper as well as envelopes and transparencies.

The BJC-800 comes bundled with a *Windows* driver, so you can print from all your favorite *Windows* applications. Canon also promises support for such popular DOS programs as *Quattro Pro, Harvard Graphics, WordPerfect,* and *1-2-3*.

If you need color infrequently, the BJC-800 is probably more printer than you need; look instead at color dot matrixes under $1000. If you need precise, fully saturated colors for formal presentations or graphic design, pricey thermal wax transfer printers may be a better choice. But if you need the kind of printing ink jets are best at—solid blocks of uncomplicated color for graphs and charts—you'll be hard-pressed to do better than the Canon BJC-800.

—Dan Miller

IN BRIEF

Canon BJC-800

The high end of color ink jet performance delivers sharp text and crisp 360-dpi graphics

Canon USA, Inc.
1 Canon Plaza
Lake Success, NY 11042
516/488-6700
Reader service no. 753

Pro Audio Spectrum

Media Vision Provides a Cure for the Multimedia Malady

Is your PC ready for multimedia? Media Vision's MPC Upgrade Kit includes a Sony CD ROM drive, a stereo sound card, and more.

The symptoms are easy to spot: a burning desire to add animation to your presentations, a ringing need to voice-annotate your spreadsheets, and a quickening pulse whenever you see video.

If these ailments plague you, several companies are ready with a cure: multimedia upgrade kits.

The kits are an attractive alternative to buying the components separately. Yes, you can run multimedia *Windows* programs on most any CD ROM player, so long as it has a data transfer rate of 150K per second, a maximum seek time of 1 second, and you've got *Windows* with CD-ROM Extensions 2.2 or later. Add a compatible audio board, and you've got the basic system.

Multimedia kits make things simpler by providing the whole shebang in one package, with the audio circuitry and CD ROM interface on one board.

The first company to ship one of these packages was Media Vision of Fremont, California. Its easy-to-install internal CD ROM kit, the ProAudio Spectrum, includes a 380ms Sony CD ROM and Media Vision's ProAudio Spectrum stereo sound board with a SCSI interface. Simply pop the ProAudio Spectrum board into one of your 16-bit slots, then slide the CD ROM into an empty drive bay and connect it to the ProAudio Spectrum board with the supplied SCSI cable, and you're basically set.

Depending on your computer, you may have to locate and attach runners to the CD player to fit it in the drive bay. And if you have other devices installed already, you might need to reset the interrupt settings on the ProAudio Spectrum board. On the plus side, Media Vision's software makes installing the necessary drivers and *Windows* extensions painless. As a bonus, the kit includes two CDs: a game, *Jones in the Fast Lane*, and *Compton's Multimedia Encyclopedia*.

The upgrade package has a list price of $995. Media Vision is also scheduled to release an external unit by the time you read this that contains a CD ROM and an audio board for $1295. The external system also includes two 100-watt stereo speakers.

If you've got multimedia fever, Media Vision has the cure. —*Patrick Marshall*

IN BRIEF

Media Vision MPC Upgrade Kit

Media Vision's easy-to-install kit of high-quality components brings multimedia to *Windows*.

Media Vision, Inc.
47221 Fremont Blvd.
Fremont, CA 94538
800/348-7116,
510/770-8600
Reader service no. 755

HiFax CFX-1PC

Put All Your Office Equipment in One Box

A small business cannot live on PCs and software alone—it also needs a fax machine, a printer, and a copier. Hitachi has rolled these office workhorses, plus a scanner, into one tiny $2195 desktop unit: the HiFax CFX-1PC.

With a small 17-by-13-inch footprint, this powerful chameleon of a peripheral assumes whatever role you want. Waiting for a call? A built-in telephone answering interface recognizes the difference between voice and fax, so you can skip the dedicated fax line. Working on a memo but need to send faxes? Use the bundled *Windows* software to instruct the HiFax to send faxes in the background at a speedy 9600 baud using the Group III standard. Then continue word processing.

The HiFax's plain-paper fax has three resolutions, selectable through the control panel: a nonstandard, but superfine, 400 dpi, as well as 200 dpi and 100 dpi. To scan a document, you must choose the scan option from both HiFax's software and from the unit's panel. As a scanner, the unit maxes out at 200 dpi, but the resulting images can be stored as TIFF and PCX files.

When it comes to copying, the CFX-1PC is no speed demon. However, you can fine-tune images to a greater degree than with ordinary copiers by adjusting a 16-level halftone-quality gray scale. You can enlarge images up to 141 percent or reduce them down to 71 percent.

The HiFax also falls short when compared with the average laser printer, offering only 200-dpi resolution, 2- to 3-page-per-minute printing, and letter-size paper, period. It contains no internal memory, using the host PC's memory instead—a problem with large graphics files.

Compared with almost any fax, copier, scanner, or printer, the CFX-1PC can't compete. But if you're starting a small business, buying this combo for roughly the same price as just one of its parts may make the trade-offs worthwhile.

—*Susan Lusty*

IN BRIEF

HiFax CFX-1PC

Hitachi squeezes an office into a compact machine that combines scanner, fax, printer, and copier.

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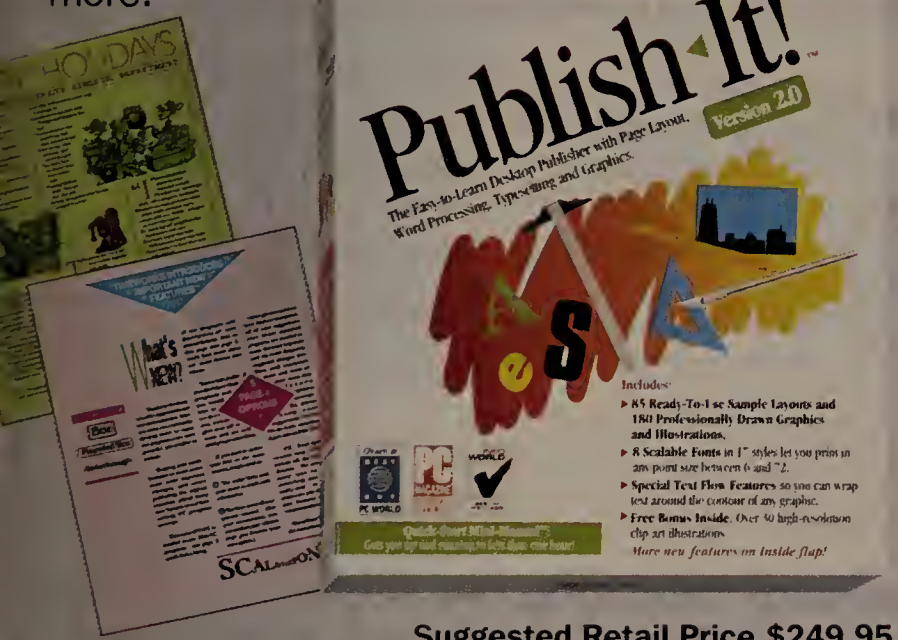

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Tempo 386SXL, Tempo 386SL, Toshiba T3300SL

A Trio of Speedy Notebooks That Run on the Technical Edge

An expensive novelty 18 months ago, today's 386 notebooks can suit any need or budget. That complicates shopping. Do you want light weight or long battery life? A better keyboard layout or a smaller case?

Three machines worth considering are Everex's Tempo 386SXL and Tempo 386SL and Toshiba's T3300SL. All three are out on the edge of 386 speed, memory, storage, and/or battery life—yet maintain the standard 8½-by-11-inch size.

All are driven by 25-MHz processors. The Toshiba T3300SL and the Everex Tempo 386SL use Intel's new version of the low-power 386SL, which, thanks in part to a 64K cache, is more than 25 percent faster than the earlier 20-MHz version. Despite the speed boost, you should get 3-plus hours of useful battery life—a little more than most 20-MHz units provide.

The Tempo 386SXL uses AMD's power-stingy 386SXL, which theoretically should offer longer battery life than the SL. However, Everex's BIOS doesn't exploit the chip's full capabilities, so you can expect about the same battery life as the others offer.

Both Everex notebooks weigh 6.5 pounds, the Toshiba 5.9 pounds. Add another pound for an AC adapter. All offer the same 1.44MB floppy, and one parallel and two serial ports for a keyboard and a VGA monitor. The T3300SL has a 9½-inch diagonal LCD with 16 shades of gray at 640 by 480 resolution, while the Tempo units have 8½-inch diagonal displays with 32 shades of gray at 640 by 480 resolution.

Although there's no expansion bus on the Tempos, Everex has given them plenty of on-board memory and storage flexibility. The Tempo 386SXL and 386SL start with 1MB and 2MB respectively. You can expand the former to 17MB and the latter to 20MB with proprietary memory modules. You get your choice of 23ms 40MB, 19ms 60MB, or 19ms 80MB drives, and you can pop out the Tempo hard drives for security or easy upgrade.

Piloted by Intel's new 25-MHz 386SL chip, the Toshiba T3300SL is 25 percent faster than its 20-MHz predecessor but stays slim at 6 pounds.

The T3300SL ships with 2MB RAM and lets you go to 8MB. The system comes with a 16ms 80MB hard drive.

Similar in capabilities, the units should have similar prices too. The T3300SL sells for $5099, only $500 more than Toshiba's popular 386SX offering, the T2200SX. Tempo prices were not set at press time, but both should retail for under $5000. —*Mike Hogan*

IN BRIEF

Tempo 386SXL, Tempo 386SL, Toshiba T3300SL

These 386 notebooks push the speed and memory envelope without sacrificing battery life and size standards.

Everex Systems, Inc.
48431 Milmont Dr.
Fremont, CA 94538
800/992-3839,
510/498-1111
Reader service no. 758

Toshiba America Information Systems, Inc.
9740 Irvine Blvd.
Irvine, CA 92713
800/334-3445
Reader service no. 757

FTSA PC

A Fault Tolerant PC That Keeps Data Safe

With mission-critical applications in mind, Texas Microsystems has produced a line of low-priced, fault-tolerant, upgradable 386 and 486 PCs.

The Fault Tolerant Systems Architecture (FTSA) PCs start at $6500; but the extra expense buys you and your data protection from power problems, defective components, software glitches, and plain old human error.

The brains behind the Fault Tolerant PC line is Texas Microsystems' diagnostic coprocessor, which monitors system operations and warns you of potential problems. If the power fails, for example, the coprocessor turns on the system's backup battery and instructs the CPU to save all open files before shutting down the system. The backup battery provides 5 to 10 minutes of power.

The company claims that any component of an FTSA PC can be replaced in minutes to reduce downtime. For example, the system comes with two 150-watt power supplies that you can swap from the front panel with the power turned on.

FTSA PCs come with a minimum 4MB RAM, upgradable with standard memory modules to 64MB. There are eight ISA expansion slots, and storage options include SCSI hard disk drives ranging from 120MB to 360MB.

Not everybody needs the reliability of a FTSA PC. If you do, this PC can't be beat.

—*Jeff Bertolucci*

IN BRIEF

Fault Tolerant System Architecture PC

A new line of personal computers built with minicomputerlike reliability for mission-critical applications.

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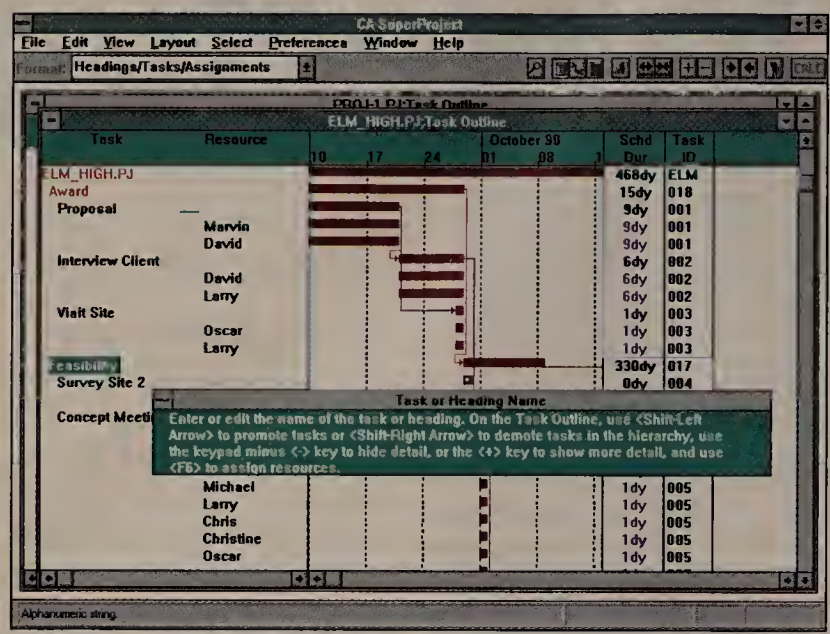
Time Line 5.0, CA-SuperProject for Windows, Microsoft Project 3.0 for Windows

Three Programs to Help You Complete Projects on Time



Computer Associates' new CA-SuperProject for Windows includes an entry-level mode to help novices create task outlines and learn a number of additional project management features.

Choosing a project management package can be a project in itself. Thanks to significant upgrades to major products in this category, the task isn't getting any easier. Symantec has brought powerful resource assignment capabilities to *Time Line 5.0;* Computer Associates has launched the *Windows* version of *SuperProject;* and Microsoft has added DDE (Dynamic Data Exchange) and OLE (Object Linking and Embedding) to *Project for Windows.*

Time Line 5.0

Symantec's new version of its flagship project management software for DOS adds a powerful resource profiling capability called Contouring, which lets you ramp up the use of a resource. For example, you can assign a task to one member of a department at a time instead of committing the whole department at once as most such packages require.

Time Line 5.0, $699, is also faster than its predecessors—speeding up features such as charting, graphing, and printing. You can save time by creating Gantt charts that show related tasks and their links as soon as you've loaded a new project. Fortunately, or not, *Time Line 5.0* also lets you know how many days your project is behind schedule.

CA-SuperProject for Windows

Computer Associates makes its powerful project manager more accessible with a new *Windows* interface. Like *SuperProject,* the $895 *CA-SuperProject for Windows* makes it easy for beginners to advance to more complex tasks by providing three modes that let you work according to your expertise.

At the entry level the program lets novices work in a basic mode and provides an Assist Window that includes context-sensitive help. Jump up to Expert Mode, and you'll be able to exploit such capabilities as the earned value analysis required of government contractors.

In complex projects with multiple tasks, creating logical connections between tasks is a point-and-click affair. You can create and edit tasks in a Gantt chart as well as in a new Work Breakdown Structure chart that shows the work in levels of complexity.

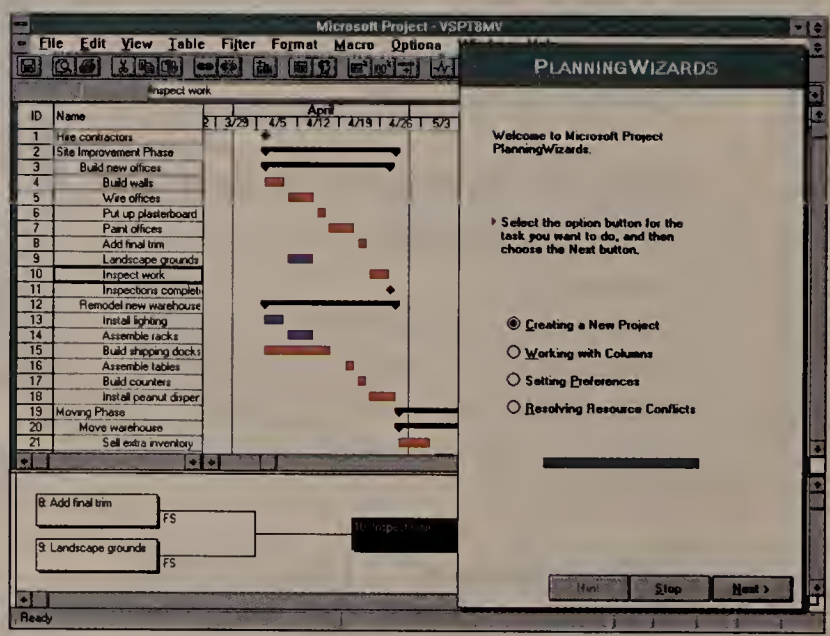
Since project management is already a multitasking application, it's well suited for the *Windows* environment. *CA-SuperProject for Windows* give you all the capabilities of its DOS cousin, and more.

Microsoft Project 3.0 for Windows

With the new version of its *Windows* project scheduling system, Microsoft has concentrated almost entirely on improving the user interface. As with *SuperProject,* you can select the level of interface that fits your expertise. At the lowest level, *Project for Windows* gives you context-sensitive windows that guide you through the process of creating a schedule. New, too, are directional arrows that indicate the flow between tasks in a PERT chart. And there's a Print Preview that shows page breaks and allows you to tailor chart printouts.

The $695 *Project 3.0 for Windows* comes with comprehensive DDE and OLE support. You can link a report in your word processor to your spreadsheet to do financial modeling, and to your data base to keep records. The result is comprehensive project management with a smooth *Windows* interface.

—*Mark S. Burgess*



Microsoft's new Project 3.0 for Windows has an improved user interface with context-sensitive windows to help beginners create schedules.

IN BRIEF

Time Line 5.0

Symantec speeds up *Time Line* and adds more flexible resource allocation features.

Symantec Corp.
10201 Torre Ave.
Cupertino, CA 95014-2132
800/441-7234
Reader service no. 760

CA-SuperProject for Windows

WINDOWS *SuperProject for Windows* gets graphical and offers a module for beginning project managers.

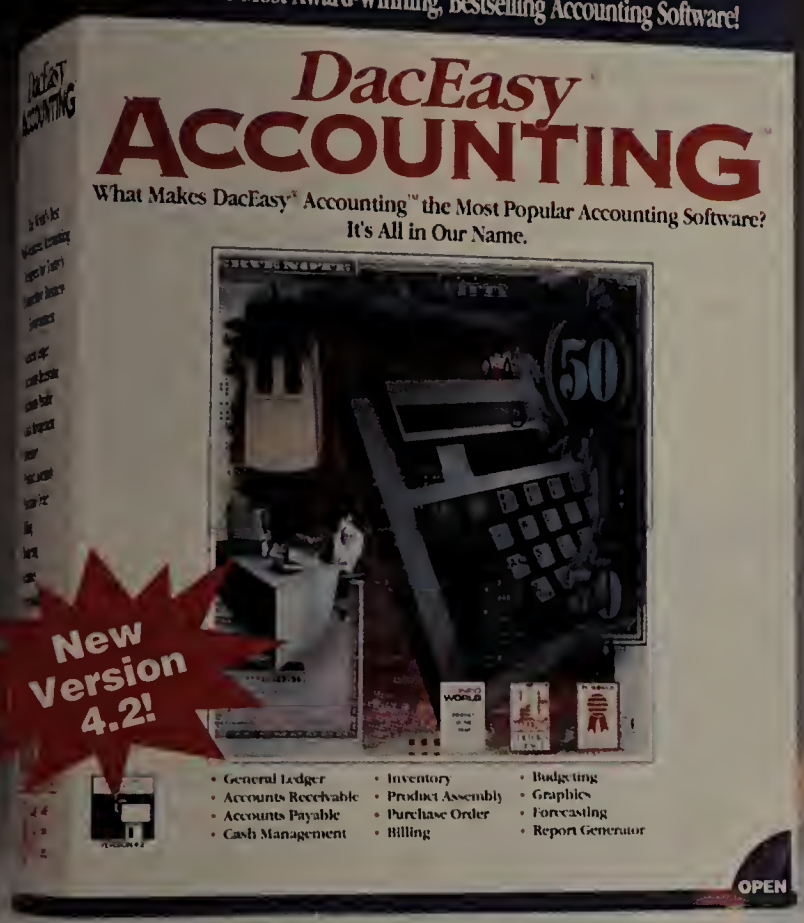
Computer Associates Int'l Inc.
711 Stewart Ave.
Garden City, NY 11530
800/645 3003, 516/227-3300
Reader service no. 761

Microsoft Project 3.0 for Windows

WINDOWS Microsoft adds DDE and OLE to *Project for Windows* and polishes the interface.

Microsoft Corp.
1 Microsoft Way
Redmond, WA 98052
800/426-9400
Reader service no. 762

A Deal.



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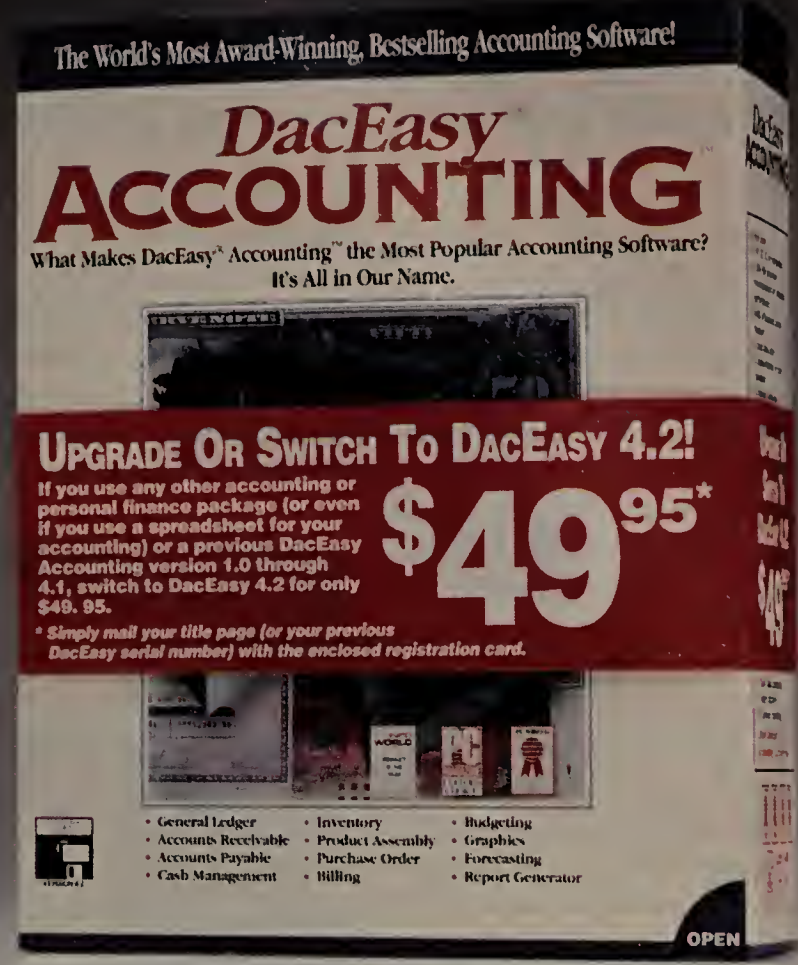

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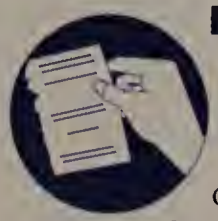

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WinTools

Dressing Up Windows Any Way You Want

There are a million ways to improve upon *Windows* Program Manager, and almost that many shell programs available that try to. The latest *Windows* shell to hit the market, Tool Technology Publishing's *WinTools* is one program where the overworked buzzwords *graphical* and *object-oriented* really apply.

Virtually everything is iconized, so almost any job can be done by clicking an icon or dragging and dropping one on another. If you want to load a file in *WordPerfect*, and you haven't associated the file's extension with that application, all you need do is drag the file from its directory listing and drop it onto the *WordPerfect* icon. As with any good *Windows* shell, the jobs of Program Manager and File Manager are combined in one program.

WinTools takes the drag-and-drop, icon-oriented approach of *Norton Desktop for Windows* far beyond that program's capabilities and offers vastly superior network and configuration tools. However, it lacks *Norton*'s file viewers and search capabilities, to say nothing of the backup, diagnostic, and other programs that make *Norton* such a complete package.

WinTools is a commercial version of the *Uporia* shareware *Windows* shell and is clearly aimed at users who enjoy tinkering with their software—and at work groups where one person sets up an environment for less-computer-inclined co-workers. The program enables you to set up a toolbar with icons that can trigger complex series of events. For instance, you could send an E-mail file simply by dragging and dropping it on an icon, then address your envelope when your E-mail program prompts you to. Like a good menuing program, *WinTools* gives you the option to restrict users to their jobs and keep them from mucking about with your design. The program also has network security built into it, allowing you to restrict file access.

If your screen gets so filled with icons and windows that you can't find anything, you can simply move to another one. *WinTools* comes with a replacement for Task Manager that lets you design and navigate through 16 virtual screens. You can have one for your favorite applications, another for your calendar, still another for a spreadsheet file you *always* have open, and so on. If you want one or more objects—the toolbar, perhaps—to be available all the time, you can put it in the same place on all your screens.

WinTools lists for $149; registered *Uporia* users can upgrade for $39, nonregistered users for $89. The original *Uporia* will continue to be available as shareware but will not be upgraded as such.

—*Lincoln Spector*

Icons rule in Tool Technology's WinTools, a shell program that makes customizing your Windows interface as simple as clicking and dragging.

IN BRIEF

WinTools

WINDOWS Soup up the Windows environment for yourself or your co-workers.

Tool Technology Publishing
1125 A St. #107
San Rafael, CA 94901
415/459-3700,
415/459-1079 (fax)
Reader service no. 759

JetForm-Design 3.0, JetForm-EMail

True to Form: Filling In All the Blanks

Creating and filling out forms is an often unpleasant reality of doing business, but JetForm Corporation has made things a little easier with *JetForm-Design 3.0* and *JetForm-EMail*.

JetForm-Design 3.0 is a major upgrade of the *Windows* forms package that's intended to help you design electronic forms that match your current hard copy, fill them in, and link the data to data base files. Version 3.0 lets you read and write *Paradox* files and includes a number of ease-of-use enhancements.

To create an input field, you simply use your mouse to draw a box, and *JetForm-Design 3.0* figures out how many characters and lines the field can accept. One important new feature is the capability to link a series of forms needed for a specific task; the upgrade also includes an improved word processor.

The program offers two configurations. *JetForm-Design 3.0* comes with the full palette of form-design tools and costs $495; *JetForm 3.0 Filler* lets you fill in forms created by the *Design* package and costs $199.

JetForm-EMail is a separate product that takes a big step toward the paperless office. This *Windows* package acts as a forms front end to *cc:Mail* or *Da Vinci eMail*. You fill out a form, address it, and click the Send button, and the form is routed to its destination. *JetForm-EMail* costs $795 for 5 users and $2395 for 20 users.

Keeping true to form, JetForm continues to make an unpleasant task a little less nasty. —*Jeff Bertolucci*

IN BRIEF

JetForm-Design 3.0, JetForm-EMail

JetForm-Design 3.0 makes forms creation less of a chore while *JetForm-EMail* lets you use electronic forms on a network.

JetForm Corp.,
163 Pioneer Dr.
P.O. Box 606
Leominster, MA 01453
800/267-9976,
613/594-8886 (fax)
Reader service no. 764

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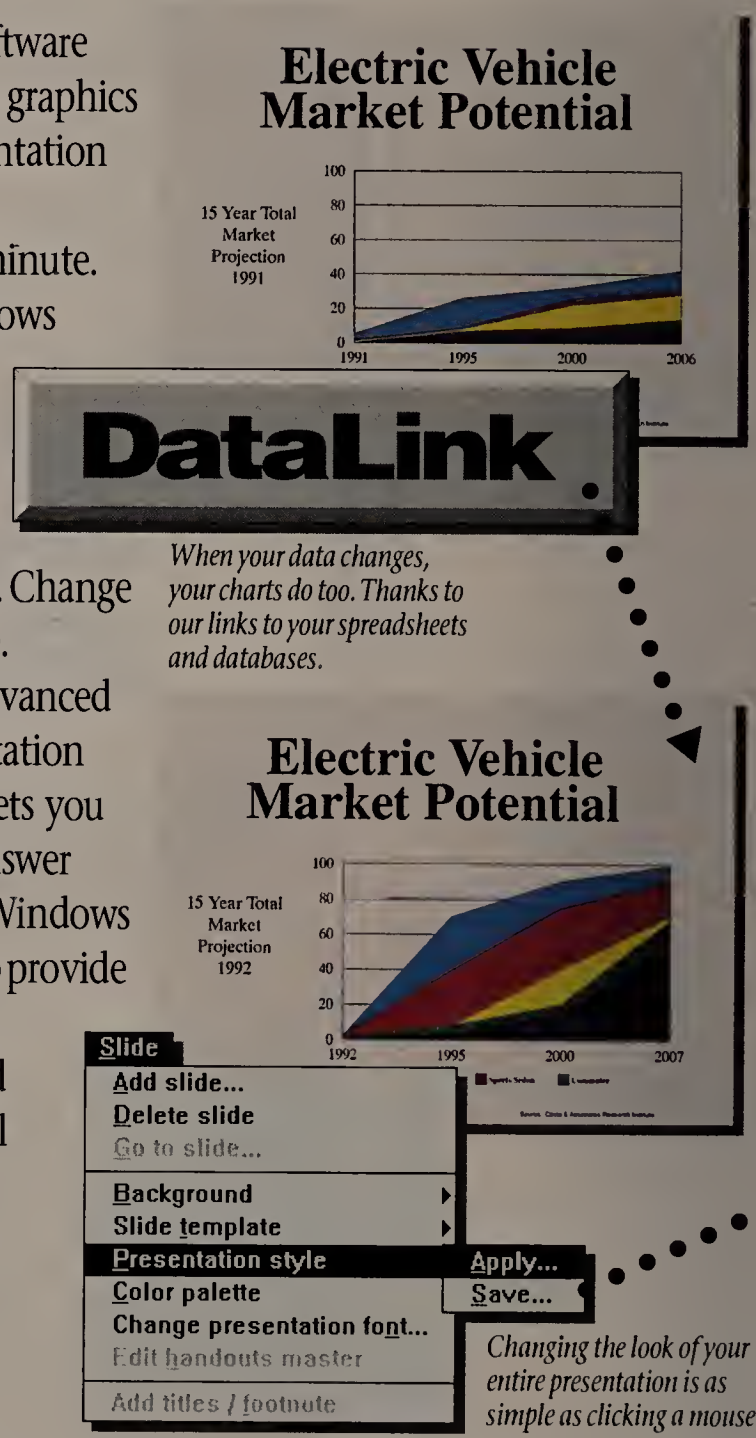

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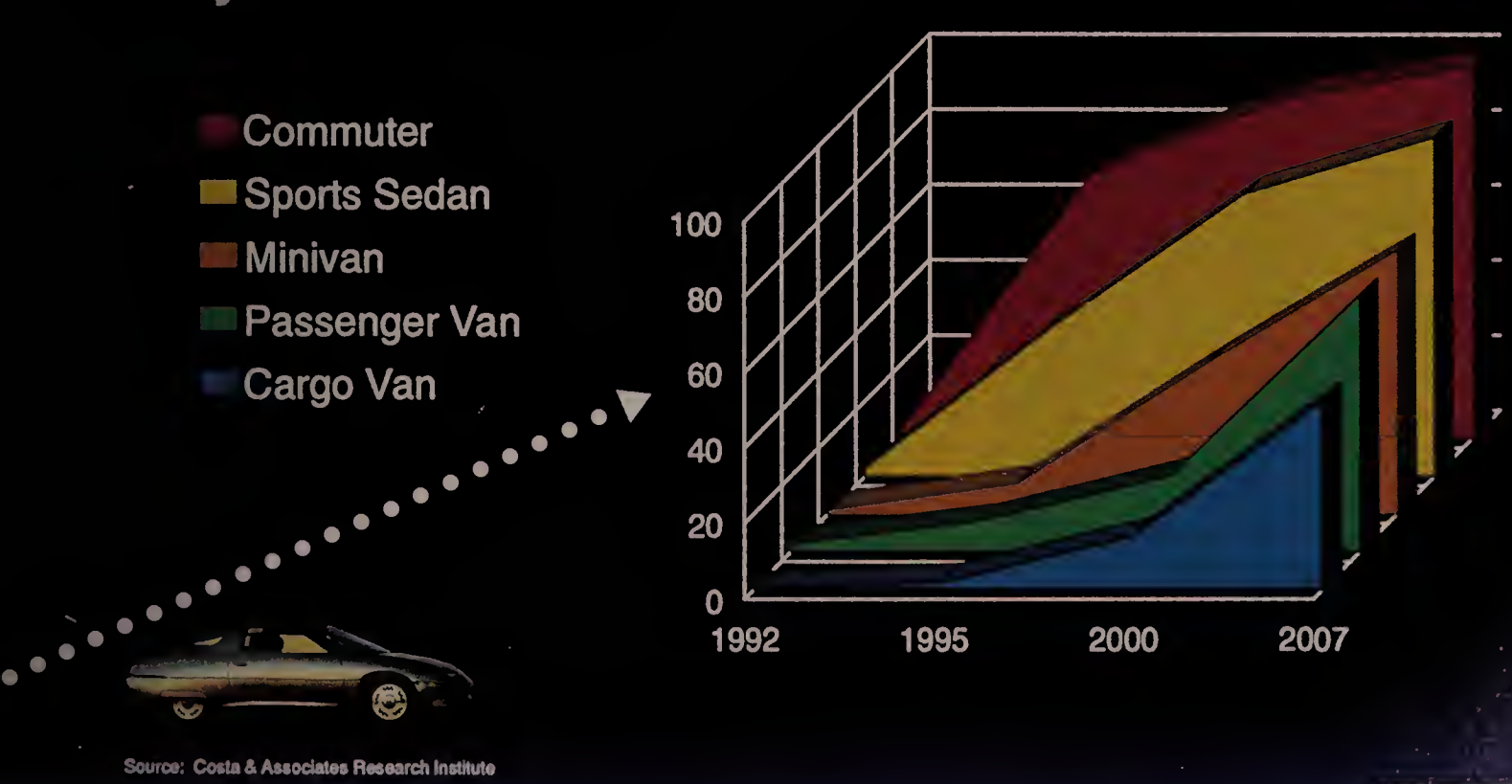
15 Year Total Market
Projection - 1992



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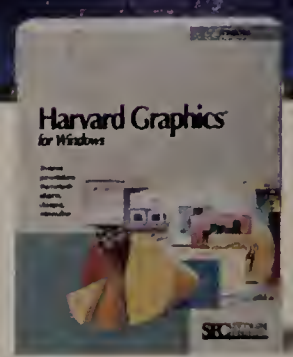

arvard Graphics for Windows demo disk.

SPC SOFTWARE PUBLISHING CORPORATION

Professional Draw for Windows

Gold Disk: Missing Only the Kitchen Sink

If the kitchen sink were a drawing tool, *Professional Draw for Windows* would have it. Gold Disk has packed the program with features for professional graphic designers, artists, and anyone who needs to create and edit images.

For a smooth start, *Professional Draw for Windows* greets you with an uncluttered interface that features 3-D push buttons for five basic drawing tools: Bézier curve, straight line, rectangle/square, ellipse/circle, and arc. Ruler guides and grids help you position objects and text precisely.

The program's Layers Manager simplifies the often difficult process of developing and managing complex drawings. You can hide or display a virtually unlimited number of layers in a drawing, rearrange or delete them, and assign them colors. *Professional Draw* also provides push-button tools to snap objects or lines to, say, the center of a circle. And placement is remarkably accurate—to within .0024 inch—so you don't have to zoom in in order to position objects exactly.

Professional Draw for Windows includes tools that let you wrap text to curves, convert text to graphics, and generate 3-D representations of text and objects in your artwork. You can edit illustrations in a full-color preview or the faster outline mode.

Professional Draw for Windows gives you an impressive collection of fill and color controls and supports 24-bit color for drawings and imported bit maps. You can create custom color libraries using the program's color palette, import *Corel Draw* files, customize paint palettes, and use the provided outline fonts, *ATM* fonts, or TrueType fonts.

Best known as a leading software supplier for the Commodore Amiga computer, Gold Disk has included the same professional features found in top-of-the-line packages like *Corel Draw* and *Micrografx Designer*—two of the leaders in the *Windows* high-end graphics market.

If you need advanced tools to create and edit images, *Professional Draw for Windows*, at $495, has the muscle and the sophistication for the job.

—*Jeff Bertolucci*

IN BRIEF

Professional Draw for Windows

WINDOWS A full-featured illustration package for graphics professionals.

Gold Disk, Inc.
5155 Spectrum Way, Bldg. 5
Mississauga, Ontario
L4W 5A1 Canada
416/602-4000,
416/602-4001 (fax)
Reader service no. 766

Graphics professionals will appreciate the built-for-speed interface of Professional Draw for Windows, which features a handy set of icons for many basic drawing and editing tools.

DynaComm 3.1, Terminal Plus

A Striking Face-Lift Gets DynaComm's Message Across

DynaComm, the pioneering *Windows* communications program, is known for its advanced scripting language and extensive support of terminal emulations, but it has always been something of a bear to use.

Now FutureSoft is reaching out to the common user with an improved *DynaComm* interface and *Terminal Plus*, a low-cost version.

DynaComm 3.1 and the new *Terminal Plus* share an attractive interface with a sculptured look similar to the style of *Word for Windows 2.0*. The interface is practical, too. All the information you need on a specific entry is in one place, and you get a *Procomm* converter script for automatically converting *Procomm* dialing directories into the *DynaComm* and *Terminal Plus* formats.

DynaComm 3.1 can share one modem over a network. No asynchronous communications server (ACS) board is required, and the shared modem can reside on any workstation—handy if you have a small LAN and don't want to buy a separate modem for each node. If you want to share more modems, an upgrade kit is available from Cross Communications.

Terminal Plus is a scaled-down version of *DynaComm 3.1* designed for the small business or home office user. It has the same protocols as *DynaComm* and includes a version of the *DynaComm* scripting language so you can automate and record log-ons. It comes with on-line documentation and a remote script function for dialing into your PC to retrieve files. *Terminal Plus* supports XMODEM, YMODEM, ZMODEM, and Kermit file transfer protocols. *DynaComm 3.1* costs $249; *Terminal Plus* costs $99.95.

If you need a high-powered communications program for business or a simpler version for personal use, *DynaComm 3.1* or *Terminal Plus* is a good call. —*Jeff Bertolucci*

IN BRIEF

DynaComm 3.1, Terminal Plus

WINDOWS *DynaComm 3.1* sports a sculptured new look, a *Procomm* script converter, and a modem-sharing feature. *Terminal Plus* is a scaled-down version.

FutureSoft
1001 S. Dairy Ashford #101
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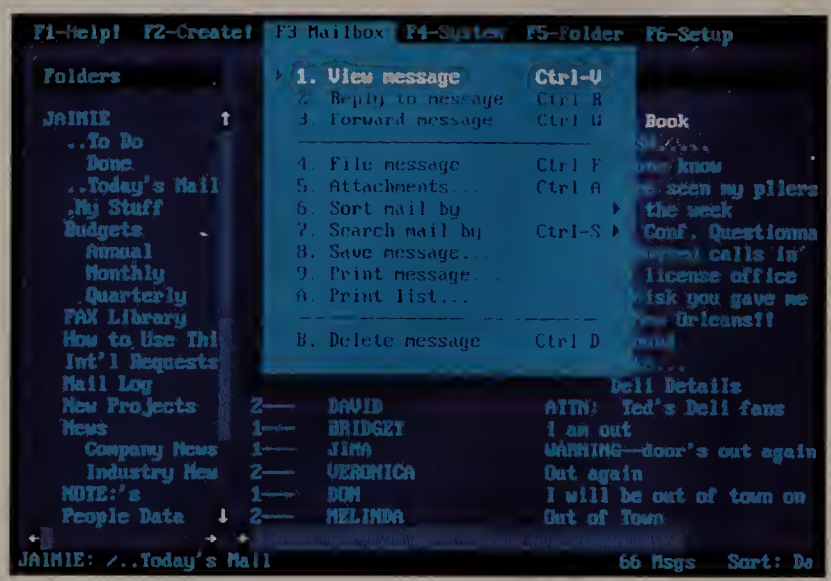
Da Vinci eMail for DOS 2.0, Da Vinci eMail for Windows 1.8

Da Vinci Threads the E-Mail Needle



Da Vinci's flexible searching and sorting features are bolstered by a handy new message-threading option that helps sort through replies.

Chances are, you've sat and puzzled over cryptic E-mail messages that read "I don't think so" or "Sure, why not?" Sometimes the subject heading furnishes a clue, but if you're just one of many addressees, you may not be sure the reply is intended for you. To avoid reply non sequiturs, many work group users append reply upon reply.

The new versions of *Da Vinci eMail* offer a better solution: message threading. Now you can search and sort through all replies to a certain message and list them by author, date, or subject. You can print or delete them en masse, reply to the originator alone or to every address copied, or file them away in *Da Vinci*'s new folders.

Folders Within Folders

These aren't just ordinary folders, they're hierarchical, so you can nest folders and set up filters to place messages automatically according to subject or author.

You can now do more in *Da Vinci* without switching to other programs. The new text editor is a mini–word processor, complete with spelling checker, and you get scalable windows and cut-and-paste capability between messages in both DOS and *Windows* versions. Also new are file viewers for reading attachments in *WordPerfect*, *Excel*, *1-2-3*, and fax formats.

All that functionality is available through the easiest-to-use interface in the messaging business. Version 2.0 also comes with a complete set of MHS-compatible connectivity options, including a remote modem version and sophisticated inter-LAN links. A *Windows* version, which adds an icon interface to the mix and the capability to drag and drop messages into folders, should be ready in March.

Da Vinci eMail for DOS 2.0 is remarkably inexpensive, about $20 to $30 per user: $295 for 10 users, $175 for each 5-user increase, $995 for each 30-user increase, and $19,995 for a 1000-user addition. —*Eric Brown*

IN BRIEF

DaVinci eMail for DOS 2.0, Da Vinci eMail for Windows 1.8

This easy-to-use LAN E-mail program makes it easier than ever to keep on top of your correspondence.

Da Vinci Systems
P.O. Box 17449
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Reader service no. 767

Andrew Tobias' Managing Your Money 8.0

Not Just Check Writing, but Tax and Financial Management

With version 8.0 of *Managing Your Money*, there's virtually no aspect of finances, investments, or taxes that you can't manage from the comfort of your PC. *MYM* juggles all your investment options—from stocks to life insurance to buying a house—with equal aplomb, weighing each in the context of the other investments and the risk you are willing to accept. Similarly, the tax and cash-flow consequences of each financial action, whether blunder or masterstroke, are duly noted.

Of course, you can still write checks, pay bills electronically, and calculate the amount of insurance you need, as with version 7.0. But unlike *Quicken*, with its ad hoc approach to bill paying, budgeting, and investment tracking, *MYM 8.0* starts with your long-range financial goals, showing you strategies to reach them and offering expert advice and common financial calculators to manage buying, selling, and paying taxes every step of the way.

For example, armed with information about your income and monthly obligations, the home affordability module calculates how much house you can afford before you talk to your banker. Other calculators help determine how much Social Security you have coming and how much you need to save for retirement and your kids' educations while presenting alternative saving and investment scenarios. The asset allocation module includes historical rates of return for stocks, bonds, real estate, and gold; it also calculates prospective rates of returns on rentals and investments and the effects of different rates of inflation, and it produces customized amortization schedules.

MYM weighs the tax consequences of your plans and codes all pertinent information, so when tax time arrives, you can export the information quickly to Mecca's *TaxCut* or other tax preparation programs for quicker, and even electronic, filing.

If you're willing to invest the time, and $190, *MYM 8.0* will pay off by helping you keep your finances under control. —*Mike Hogan*

IN BRIEF

Andrew Tobias' Managing Your Money 8.0

The latest version of this personal finance favorite beefs up investment and tax planning resources and provides expert advice.

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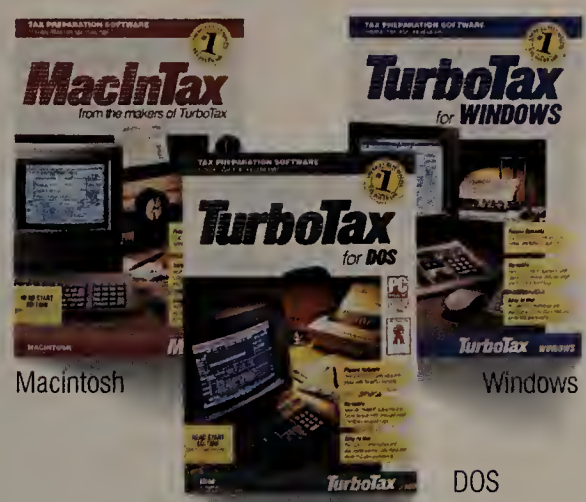

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Right Hand Man for Windows

The Right Hand Man Packs the Swiss Army Knife of E-Mail

Packed with time-management and information-sharing tools, *Right Hand Man for Windows* from Futurus goes head-to-head with *PackRat for Windows* as the Swiss army knife of E-mail/groupware programs.

Futurus has tried to keep its first *Windows* version of *Right Hand Man* as close to the DOS version as possible. You'll find support for Novell's Message Handling System and a host of other features.

The new *Right Hand Man for Windows* offers a fully integrated *Windows* interface (unlike the DOS version, which pops up over *Windows*) and includes a group scheduler, a to-do list, and an icon bar that lets you click on features you've previously selected off a menu. DOS and *Windows* versions of *Right Hand Man* can reside on the same network, allowing users of both programs to exchange messages. With the optional *Right Hand Man Remote*, you can send and receive E-mail and faxes when traveling.

Other features include a notebook, a fax viewer for sneaking a peak at incoming faxes, and a card file that lets you use standard *dBASE III* files. One feature missing from the *Windows* version is Futurus's voice annotation.

Right Hand Man for Windows costs the same as its-DOS counterpart: $495 for 5 users, $1995 for 25 users, $4995 for 100 users. *Right Hand Man Remote* costs $299 for 1 user and $149 for each additional user.

Right Hand Man for Windows sports an impressive array of features, making it hard to beat as the groupware program of choice for businesses. —*Jeff Bertolucci*

IN BRIEF

Right Hand Man for Windows

WINDOWS This groupware package offers E-mail, group scheduling, a fax viewer, and more.

Futurus Corp.
211 Perimeter Center Pkwy.
#910
Atlanta, GA 30346
800/327-8296,
404/392-7979
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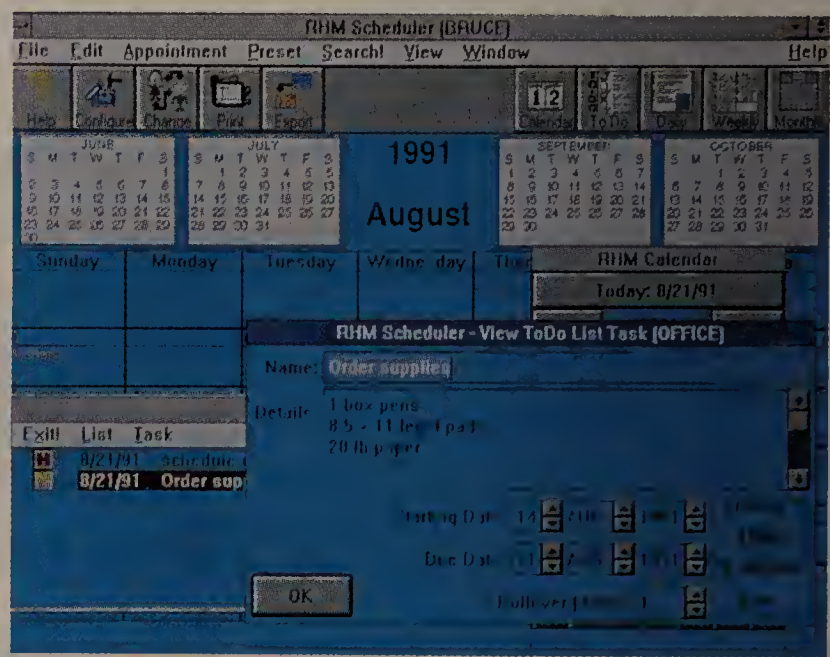

Right Hand Man for Windows comes with a complete set of groupware tools for businesses, including group scheduler, to-do list, and more.

Bookshelf for Windows

Multimedia's Debut: Late but Impressive

Bookshelf for Windows is an extremely easy-to-use reference library that puts a wealth of knowledge within reach of your mouse while it introduces you to multimedia.

Like the DOS version of *Bookshelf*, the *Windows* version comprises seven major references: *Hammond World Atlas*, *Roget's Thesaurus*, *Concise Columbia Encyclopedia*, *American Heritage Dictionary*, Bartlett's *Familiar Quotations*, *Concise Columbia Dictionary of Quotations*, and *World Almanac*. Unlike with the DOS product, however, you are able to check into *Bookshelf for Windows* any time from within any *Windows* application. That capability makes it a snap to look something up while you're writing in your word processor, for example, and even to cut and paste.

If you're not sure what multimedia is, this application will enlighten you. After you load *Bookshelf for Windows*, go straight to the encyclopedia, select *Animations* from the table of contents, and then choose *Eclipse*. You'll see a standard text entry explaining eclipses, accompanied by an animated graphic of the moon moving around the Earth. Explanatory graphics pop up as the animation runs, and there's a voice straight out of high school science movies explaining it all.

Bookshelf lets you search across all seven volumes at once or only selected ones. And *Bookshelf* makes it easy to navigate via a row of buttons at the top of the screen. You can always trace back step by step, or jump right back to the beginning. Even better, you can cut and paste data to the *Windows* Clipboard, insert annotations, and place bookmarks for reference.

The big disappointment is that there isn't greater use of multimedia in *Bookshelf*. There are 27 excellent animations, with sound and animated illustrations, mostly on scientific subjects. And there are also 12 audio demonstrations of musical elements from harmony to counterpoint. But audio output is hard to find in the rest of the data base.

And there's the rub. By giving you a handful of excellent multimedia implementations, *Bookshelf* whets your appetite for multimedia but certainly doesn't leave you sated. Nonetheless, at $195, *Bookshelf for Windows* is an excellent value for any *Windows* wordsmith, even if you don't have speakers on your PC.

—*Patrick Marshall*

IN BRIEF

Bookshelf for Windows

WINDOWS A premier reference library gives you a sampling of the power of multimedia.

Microsoft Corp.
1 Microsoft Way
Redmond, WA 98052-6399
800/426-9400
Reader service no. 763

The Experts in Accessories

Manufacturing Company, Inc.
CURTIS

1. Curtis Top Shelf: Ingenious tray system mounts on top of monitor • Keeps paperwork within easy reach • Makes a great In/Out box • Fits any monitor, including Macintosh® series. Lifetime Warranty. Made in USA. #TS-1 Retail . . . $19.95

Curtis Keyboard SpaceSaver II: For slide away storage under monitor • Built-in drawer holds supplies, paper to legal size • Lifetime Warranty Made in USA. #KS-2 Retail . . . $49.95

2. Curtis Keyboard SpaceSaver: Slide keyboard away when not in use • Protect keyboard from spills, debris • Fits any keyboard. Lifetime Warranty, Made in USA. #KS-1 Retail . . . $39.95

3. Curtis Universal Printer Stand: Store paper underneath • Fits any printer, standard or wide carriage, rear or center paperfeed • Stacks printouts in detachable receiving tray. Lifetime Warranty, Made in USA. #PS-1 Retail . . . $24.95

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HP F1006A Mobile Data Link

Untethered but in Touch: A Wireless Link for Your HP 95LX

Need to receive messages from the office while on the road? If you own a Hewlett-Packard 95LX palmtop, you have to consider HP's new $119.95 F1006A Mobile Data Link. This ingenious product provides a cradle for your 95LX and built-in software to link the little palmtop to Motorola's even smaller NewsStream receiver, which is basically a modified pager.

Once the Mobile Data Link is attached, you can import messages received wirelessly by NewsStream directly into the HP 95LX appointment book or memo editor, *1-2-3*, or other 95LX applications.

Motorola's NewsStream ($299) can receive and store as many as 56 messages in its 32K of RAM even when not connected to the HP 95LX. A flashing green light on the NewsStream alerts you to waiting messages. Your company can send messages to NewsStream through such paging services as Embarc or SkyTel (prices for paging services range from $50 to $80 per month.)

Hewlett-Packard's Mobile Data Link cradle is built to hold both the HP 95LX palmtop PC and a wireless communications device such as Motorola's NewsStream receiver (right).

According to Hewlett-Packard, other devices designed for the Mobile Data Link cradle are in the works. One such is the Global Positioning System, an instrument that uses a satellite to determine your exact longitude, latitude, and altitude anywhere in the world. Although such a device may be better suited to a soldier lost in the desert than to a business traveler, it demonstrates the potential of wireless communications and the portable PC.

—*Jeff Bertolucci*

IN BRIEF

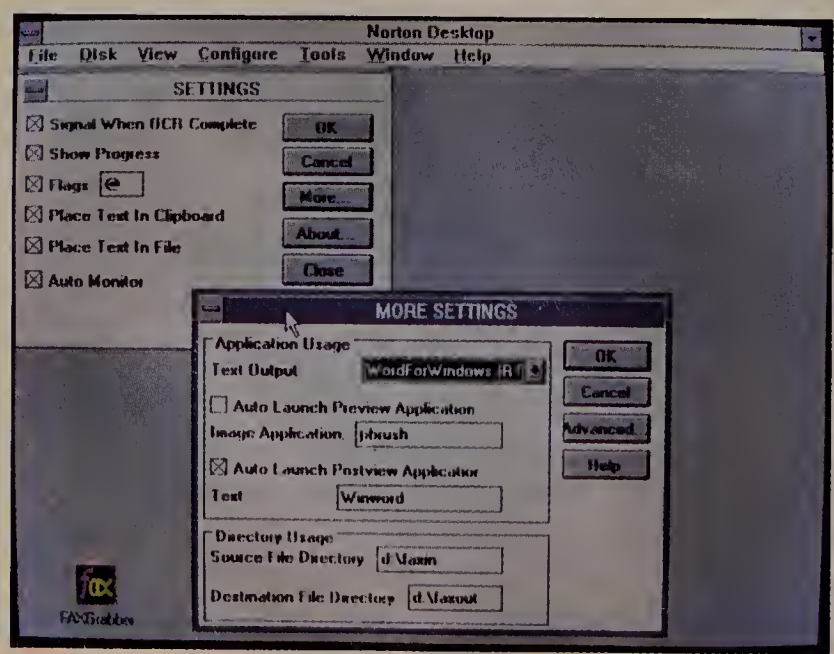
HP F1006A Mobile Data Link

A cradle-software combo for the HP 95LX palmtop works with the Motorola NewsStream wireless receiver to deliver E-mail to business travelers.

Hewlett-Packard Co.
1000 N.E. Circle Blvd.
Corvallis, OR 97330
800/443-1254,
503/750-3593
Reader service no. 771

FaxGrabber

Grab, Revise, Convert, and Send Faxes From Within Windows



FaxGrabber taps Windows' Paintbrush to convert incoming faxes so you can decide whether to convert them to text or save them as images.

FaxGrabber from Calera Recognition Systems is a conversion utility that turns incoming faxes into text or image files so you can make revisions quickly and in addition keep your hard disk clear of clutter.

To convert incoming fax documents to text, you click on the *FaxGrabber* icon to bring up a dialog box offering a choice of more than 20 file conversion formats, including everything from plain-vanilla ASCII to popular word processing, graphics, desktop publishing, data base, and spreadsheet formats. *FaxGrabber* uses Calera's *WordScan* OCR software to convert fax files to text.

You can output the converted file to a specific application directory or save it to the Clipboard to paste in a directory later.

Thanks to a preview feature, you can use *Windows'* Paintbrush to review an incoming fax before deciding whether to convert it to text, save it as an image file, do both, or do nothing.

The utility supports PCX, DCX, and most TIFF formats.

FaxGrabber costs $149. Calera will sell the utility to owners of Intel fax cards at a special $99 price.

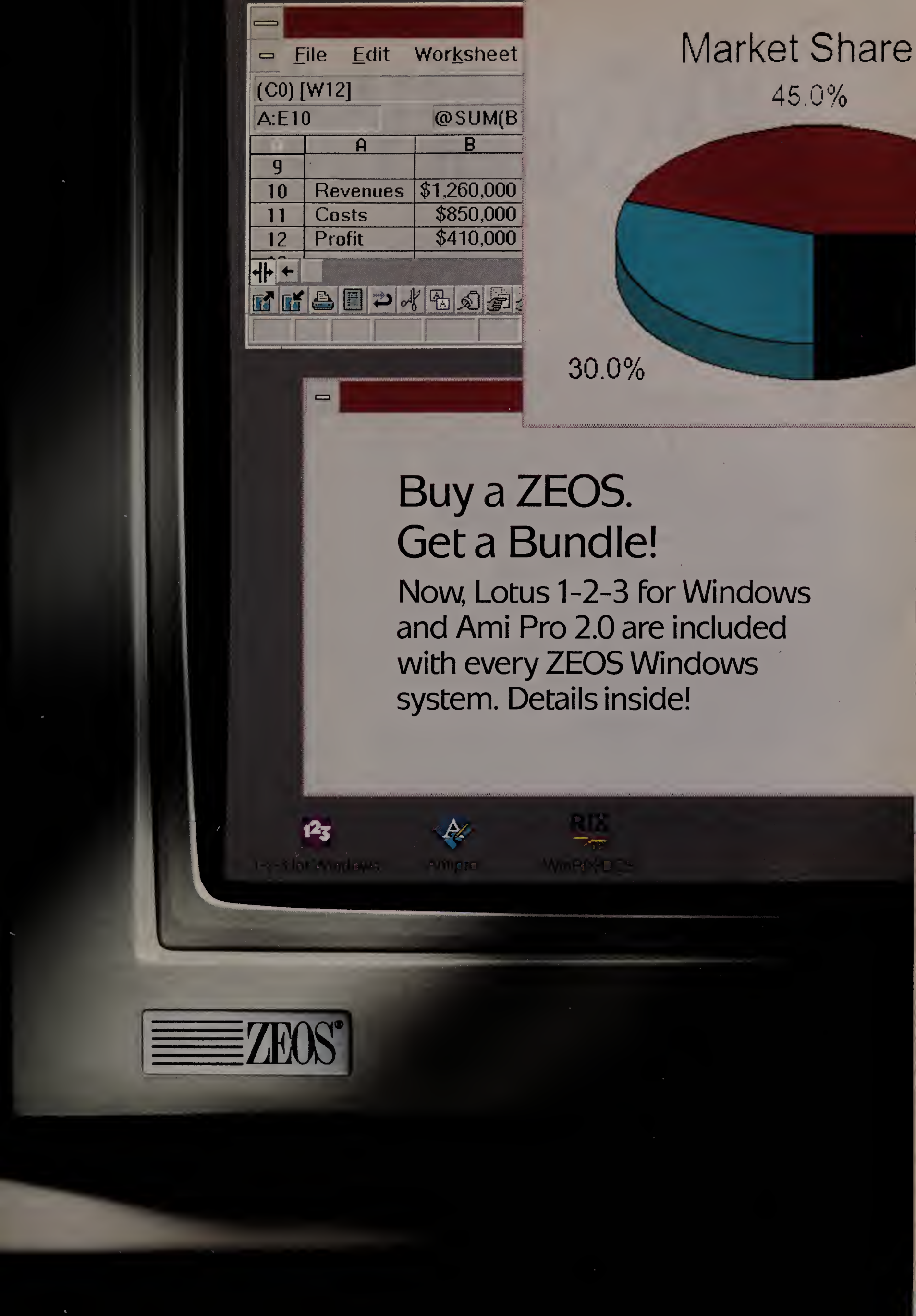
If you receive a lot of PC faxes you'd like to manipulate in their native file format, *FaxGrabber* can make your life a lot easier. —*Jeff Bertolucci*

IN BRIEF

FaxGrabber

WINDOWS A Windows utility that converts incoming faxes into text or image files.

Calera Recognition Systems
475 Potrero Ave.
Sunnyvale, CA 94086
800/544-7051,
408/720-0999
Reader service no. 770


File Edit Worksheet
(C0) [W12]
A:E10
@SUM(B
A B
9
10 Revenues $1,260,000
11 Costs $850,000
12 Profit $410,000
Market Share
45.0%
30.0%
Buy a ZEOS.
Get a Bundle!
Now, Lotus 1-2-3 for Windows and Ami Pro 2.0 are included with every ZEOS Windows system. Details inside!
ZEOS®

1-2-3® for Windows

Now included in every

For a limited time only, ZEOS Windows systems buyers will also receive Lotus 1-2-3 for Windows plus Ami Pro 2.0, the Lotus Word Processing package for Windows. Complete and fully documented!

Your new ZEOS Windows system includes Microsoft Windows Version 3.0 plus a genuine Microsoft Mouse.

Unbelievable? Believe it! Because now, when you buy any new ZEOS Windows® system, you will also receive Lotus *1-2-3 for Windows* plus Lotus' new word processor for *Windows, Ami Pro™ 2.0* at no additional charge!

It's the ultimate bundle! First, you're going to be receiving the incredible new ZEOS modular system complete with the upgradable CPU of your choice. These new ZEOS systems are the hottest computers money can buy. And that's just for starters.

Because you're also receiving the hottest software money can buy. Yet you don't have to buy it. Because we're including it at *no additional charge.* Go ahead and pinch yourself, it's really true!

And not only are you receiving the *amazing* new Lotus *1-2-3® for Windows* and *Ami Pro 2.0,* you're also getting Microsoft® *Windows* itself, plus a genuine Microsoft Mouse plus Microsoft *DOS 5.0.* All included at one low package price.

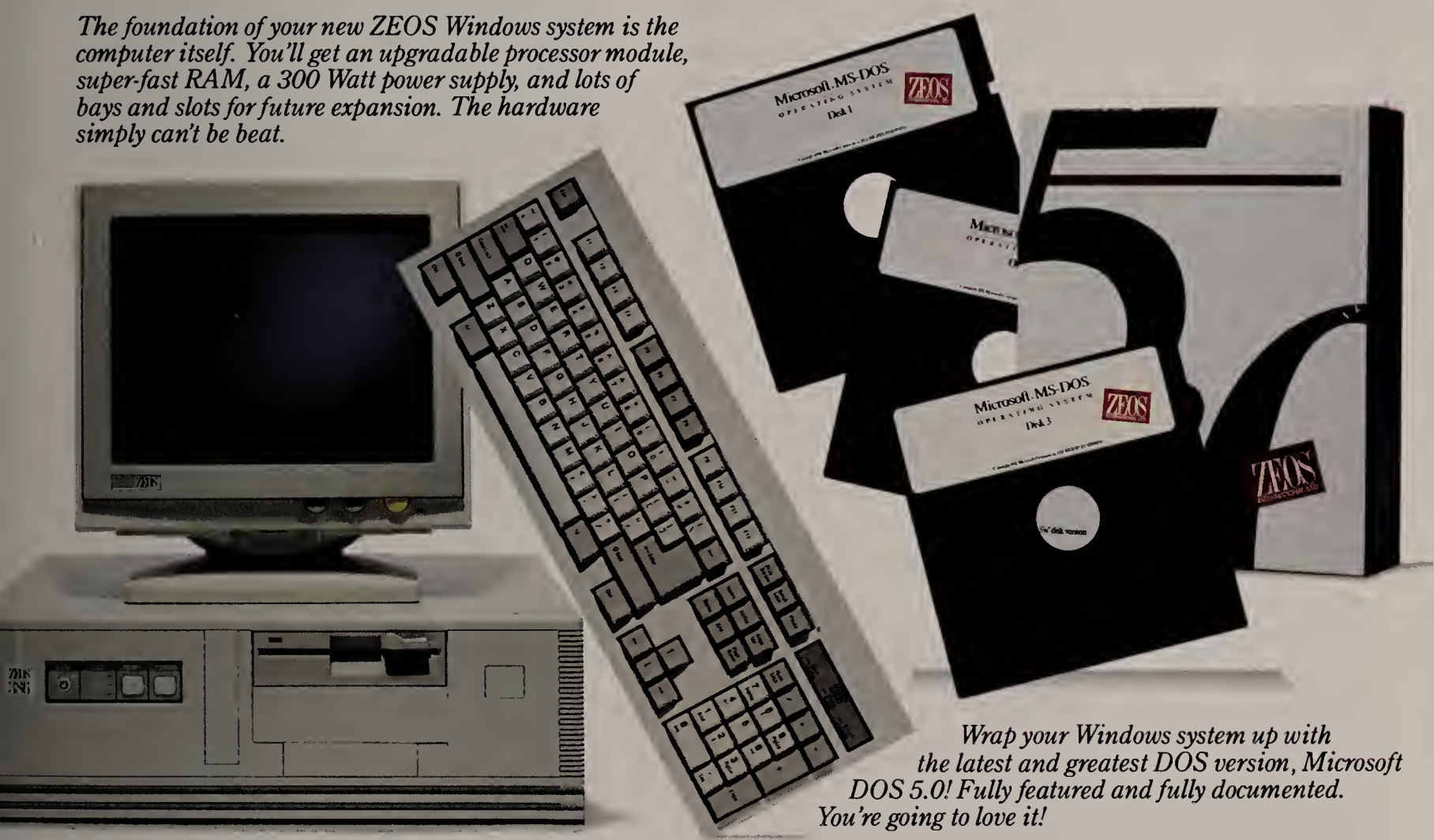
These are not some scaled down versions or trial disks either. They are the *complete* and *fully documented* editions of Lotus *1-2-3 for Windows* and Lotus *Ami Pro 2.0* for *Windows* provided to you by special arrangement between ZEOS and Lotus. This is one incredible value that no one else can offer. You're going to love it, too.

Because nothing else brings out the power of the most powerful software like your blazing new ZEOS system. And when you strap your-

plus Ami Pro® 2.0!

ZEOS Windows System.

The foundation of your new ZEOS Windows system is the computer itself. You'll get an upgradable processor module, super-fast RAM, a 300 Watt power supply, and lots of bays and slots for future expansion. The hardware simply can't be beat.



Wrap your Windows system up with the latest and greatest DOS version, Microsoft DOS 5.0! Fully featured and fully documented. You're going to love it!

self in and fire up *Windows* with Lotus *1-2-3* and *Ami Pro,* you're in for the ride of your life!

After all, nobody knows spreadsheets better than Lotus. And when they sat down to write *1-2-3 for Windows* they created a masterpiece. It starts out as a full-fledged *Windows* application. Offering that perfect balance of power and simplicity, it remains fully compatible with all the earlier versions of *1-2-3.* And it's absolutely loaded with new features.

Power, Simplicity, complete Compatibility *plus* loads of new features. It's Lotus *1-2-3 for Windows* and it comes with every ZEOS Windows system. And so does *Ami Pro 2.0!*

After all, *Ami Pro 2.0* is the Lotus word processing program that was designed for Windows from the ground up. Linking with a full suite of Windows applications *including* your new Lotus *1-2-3 for Windows, Ami Pro 2.0* is perhaps the finest word processor on the market today.

Buying your new ZEOS Windows system is possibly the best purchase decision you'll ever make. Then add to it Lotus *1-2-3 for Windows, Ami Pro 2.0* plus *Windows 3.0, DOS 5.0* and a genuine Microsoft mouse. It's an offer that can't be beat and one we simply can't offer for long. So pick your new ZEOS Windows package now and we'll include a bundle! *Call now 800-423-5891!*

ZEOS-486·33

PC MAGAZINE EDITOR'S CHOICE 2-11-92

Upgradable. High Performance. Low Cost. And every ZEOS Windows system comes with Lotus *1-2-3 for Windows* and *Ami Pro 2.0* at no additional charge. Absolutely incredible!

With ZEOS 386-25s starting at only $1395 right thru '486-33MHz systems starting at $1795, computing will never be the same again! And it's not just the prices that make these new systems hot. It's Performance and Upgradability as well.

When we first sat down to design these new systems, we wanted computers that would *blow the doors off* anything else out there. Plus, we wanted you to be able to upgrade from one CPU to another as your computing requirements changed, *without having to buy an entirely new system.* The results?

UPGRADABLE CPU

Incredibly low cost, high performance systems so very advanced you can move freely from the '386 family of processors to the latest '486s all without a moment's hesitation.

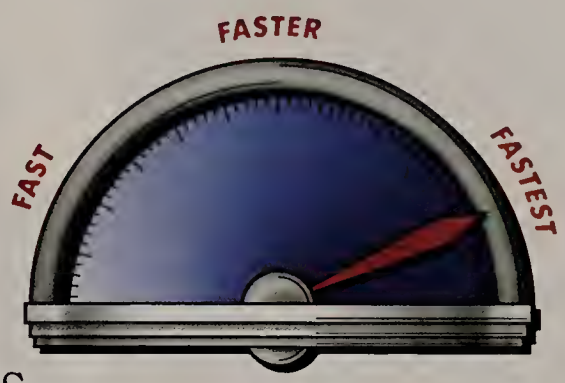
Now, you can pick your power! Today *and* tomorrow. Choose from high speed '386-25 and 33MHz systems, either cached or non-cached, plus the '486SX and '486-33MHz with or without a secondary cache. Whichever you decide upon you know that as your computing requirements change, your processing power can change as

Upgradable.

Hot New ZEOS '38

well. But are the prices really that good?

Yes. *Absolutely Yes!* The prices really *are* that good, and the quality too. Because when you buy from ZEOS you're buying directly from the manufacturer. Starting with the main system board, your new computer is designed and built by us right here in Minnesota. That saves money for you. And your ZEOS factory direct advantages are evident not only in the price, but in the performance and quality of your system too.



Z•SPEED METER

To help you select the processor option that's right for you, we have developed the Z-Meter. *The* Z-Meter *shows you the relative performance gains achieved by moving from one processor module to another—fast, faster, fastest! No matter which system you select you can be sure of one thing*—these babies are Hot!

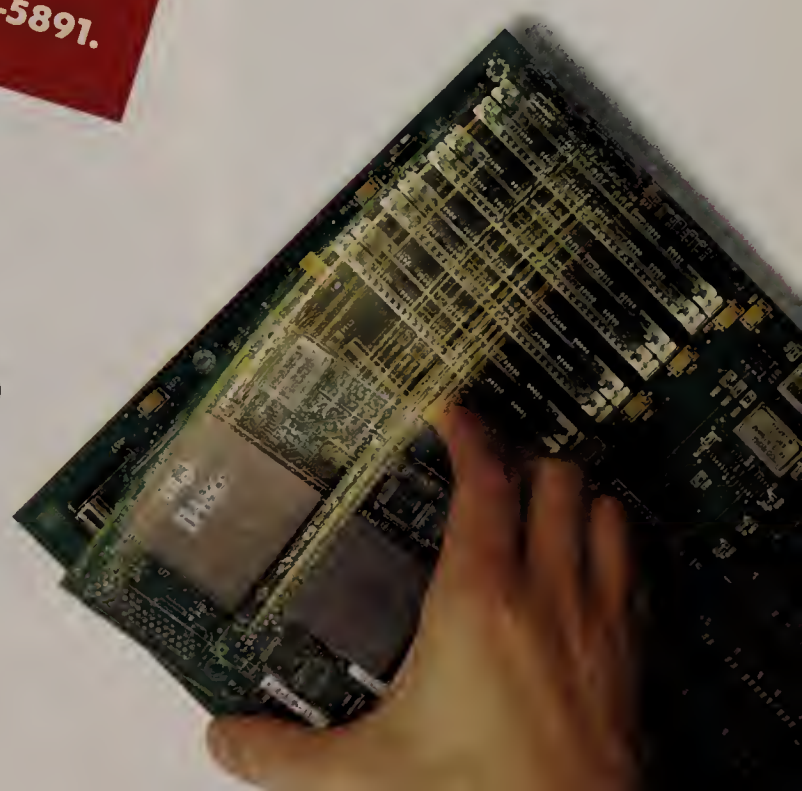
Not only that, but your new ZEOS system is supported around the clock by our 24 Hour a Day Toll Free technical support hotline. Should you have any questions, we're here to help, 24 hours a day, 365 days a year!

So if you're looking for a high speed, upgradable, rock solid system supported like none other *and* you want incredibly low prices, you've found your company. And your computer. Read on!

This ZEOS ad reviews each of four money saving upgradable system packages based on processor type. For a limited time only, every ZEOS Windows system includes Lotus 1-2-3 for Windows and Ami Pro 2.0 at no additional charge! Call 800-423-5891.

Low Cost.

nd '486 systems!



ZEOS. Your

ZEOS COMPLETE SYSTEM PACKAGE #1

- The Processor and Speed of your choice plus future upgradability!
- 1MB of High Speed RAM, expandable to a system total of 32MB right on the motherboard.
- 42MB High Speed IDE hard drive with its own cache.
- 1.2MB or 1.44MB Teac® floppy drive.
- ZEOS 14" flat screen Hi-Res amber monitor with Tilt/Swivel Base.
- Shadow RAM and EMS support for enhanced performance.
- ZEOS/RS 101 key SpaceSaver keyboard.
- Two Serial, one Parallel & one Game Port built right onto the motherboard.
- 7-16, 1-8 bit expansion slots. 80387 math co-processor support for '386 systems.
- Rugged ZEOS SpaceSaver case with twin cooling fans for added reliability and product life.
- Seven drive bays and our custom 300 Watt power supply for your future expansion!
- Includes ZEOS 24 Hour a Day Toll Free Technical Support and Customer Satisfaction package.

PACKAGE #1

486-33	$1795
486SX-20	$1595
386-33	$1495
386-25	$1395

For Vertical Systems add only $150.

Harnessing the ZEOS power and value you want is easy. Pick your processor then your package. Package #1 gets you up and running for a very reasonable price. To add even more options *and* savings select from Packages 2, 3 or 4.

Because when you select from Packages 2, 3 or 4 you receive VGA, additional memory, larger drives and more. You also receive *Windows 3.0* plus Lotus *1-2-3 for Windows* plus Lotus' great new *Windows* word processor *Ami Pro 2.0,* plus Microsoft *DOS 5.0* plus a genuine Microsoft Mouse. Nobody gives you this combination of hardware *and* software power. It's all yours, all for one low package price from ZEOS!

And that's just for starters. Because *inside* your new ZEOS system rests the very latest advancements in surface mount, high integration technology. As an example, we have freed two normally occupied expansion slots by placing our high speed IDE hard drive and floppy drive interfaces right on the main board. Then, we put the high speed serial, parallel and game ports on the motherboard too. The result?

Eight expansion slots, *seven* of which are available for your future use! After all, expansion and non-obsolescence are what these great new ZEOS systems are all about. We've built in some other very important expansion features for you as well.

Like our *300 watt* power supply. Providing you with all the pure clean power you'll need right now, your ZEOS 300 watt supply also provides you with plenty of power for the future as well. Plenty of slots, plenty of power. How about space? This is where ZEOS has performed something akin to magic.

It's your new ZEOS SpaceSaver case! Complete with *seven drive bays,* this incredible case is actually *smaller* than many cases offering only five bays. We've also added *a second whisper quiet cooling fan.* Why? Because whether you expand your system or not, the cooler it

INCREDIBLE ZEOS PACKAGE #2

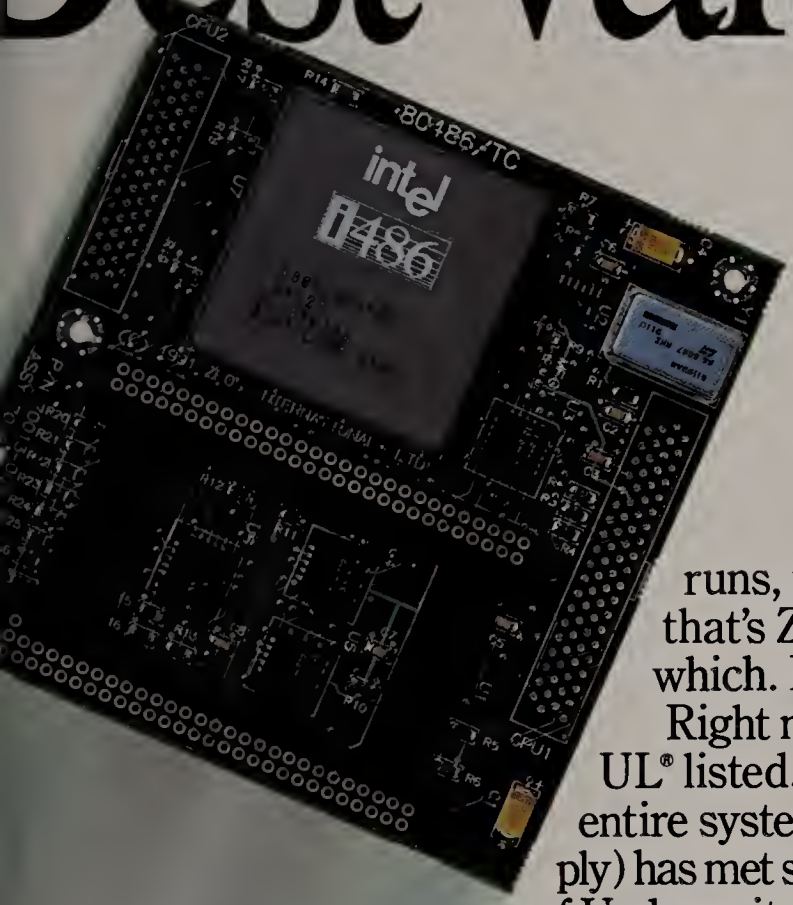
We take Package #1 and upgrade your ZEOS Modular System to include:

- 2 full Megabytes of Rip-roaring RAM.
- Our incredible 107MB IDE hard drive with its own built in cache.
- Both the Teac® 1.2MB *and* 1.44MB floppy drives.
- Diamond SpeedStar Hi-Color VGA card/1MB RAM & Sierra DAC (32,000+ colors)!
- ZEOS 14" High Res VGA Mono Monitor with Tilt & Swivel Base.
- Lotus 1-2-3 for Windows, *plus* Ami Pro 2.0, *plus* Microsoft Windows and DOS 5.0, *plus* a genuine Microsoft mouse!

PACKAGE #2

486-33	$2295
486SX-20	$2095
386-33	$1995
386-25	$1895

Best Value!



486-33 $2795
486SX-20 $2595
386-33 $2495
386-25 $2395

runs, the longer it will last. Now that's ZEOS *value*. Speaking of which. How about UL® listings? Right now every ZEOS system is UL® listed. This listing means your entire system (not just the power supply) has met stringent safety requirements of Underwriters Laboratories. We believe UL® listings also say a lot about quality. And UL® safety listings are something many of our competitors simply don't (or can't) provide. At ZEOS quality and safety are important to us. *You* are important to us.

Price. Performance. Quality and Support. There are *many* reasons to buy your new ZEOS upgradable system. Plus, your ZEOS advantages include *24 Hour a Day Toll Free* Support and our 30 Day Money Back Guarantee and ironclad warranty (for more ZEOS advantages see the section entitled *"Why ZEOS is Your #1 Choice"*).

486-33 $3295
486SX-20 $3095
386-33 $2995
386-25 $2895

Selecting your new ZEOS system is easy. Choose from any of the money saving packages shown here. Or let your friendly and knowledgeable ZEOS Systems Consultant help you configure exactly what you want from our huge selection of upgrades and options. Whatever you select, one thing is for certain.

Buying your new ZEOS system is perhaps the best purchase decision you'll ever make! Simply pick up the phone and give us a call now. Incredible ZEOS power awaits you! *Call now Toll Free, 800-423-5891.*

For Complete Processor and Package Pricing, simply turn the page!

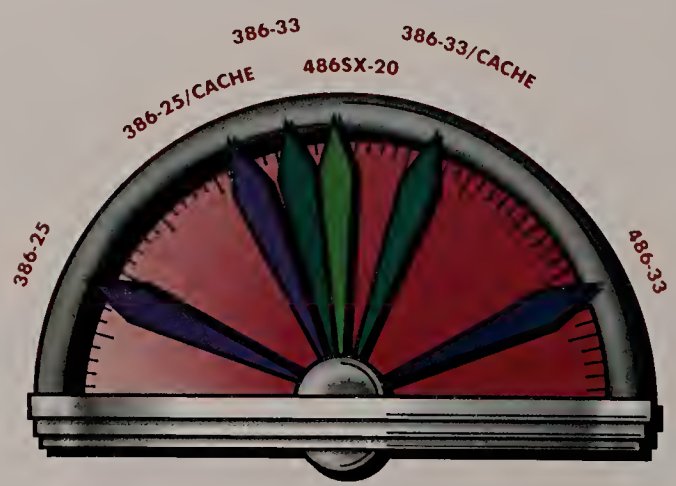
Pick You
Package

Or Let Us Custom Build to

Now, ZEOS lets you pick the power you want for the price you want to pay! Not only that, every ZEOS Windows System (Packages 2, 3 and 4) includes not only Microsoft *Windows*, *DOS* and a mouse—we're also including Lotus *1-2-3 for Windows plus* Lotus' new Windows word processor *Ami Pro 2.0!*

And with your new ZEOS modular system, the computer that's right for you today is also the computer that's right for you tomorrow. In the future, you can upgrade to even more performance with a new '386 or '486 processor module.

And that's only the start of your many ZEOS system advantages. But what more could there be than dazzling performance, incredible prices and upgradability? From ZEOS there's lots more.



Z•SPEED METER

Let the "Z-Meter" help you pick the processing power that's right for you. The comparisons are easy to make. Fast, Faster or Fastest!

Because your new ZEOS system is not only fast, it's absolutely *loaded with features.* Like our *300 watt* power supply, eight expansion slots, twin cooling fans (for even more reliability) and our unique seven bay SpaceSaver case. And, *every ZEOS system is UL®* listed.

r Power, & Price!

our Exact Specifications.

PACKAGES 2, 3 AND 4 INCLUDE LOTUS BUNDLE!

	Pkg. #1	Pkg. #2	Pkg. #3	Pkg. #4
386-25	$1395	$1895	$2395	$2895
386-33	$1495	$1995	$2495	$2995
486SX-20	$1595	$2095	$2595	$3095
486-33	$1795	$2295	$2795	$3295

Add $200 to any price for a 128K cache.

In addition to all of these standard ZEOS advantages, you're also receiving our legendary ZEOS Technical Support, *24 Hours a Day, 365 Days a Year.* Plus, our 30 day Absolute Satisfaction Money Back Guarantee and more!

So pick your Power, and your Price *then give us a call!* Your expert ZEOS Systems Consultant is ready to answer any questions you may have. Why not give us a call right now, Toll Free at 800-423-5891.

Call to confirm current pricing, product specifications and configurations, all are subject to change without notice. Purchase orders subject to approval. Lotus, 1-2-3, Ami Pro, Classic and SmartIcons are trademarks of Lotus Development Corporation; Windows and Microsoft of Microsoft Corporation; Z-Card, SpaceSaver, and ZEOS of ZEOS International, Ltd., 530 5th Avenue NW, St. Paul, MN 55112 USA © 1991.

INCREDIBLE ZEOS PACKAGE #3

Add even more memory, a larger drive. And more Savings! You now receive:

- **4 full Megabytes of Ultra High Speed RAM.**
- **Our fast 130MB IDE hard drive with built in cache.**
- **Teac® 1.2 & 1.44MB FDD'S!**
- **Diamond SpeedStar Hi-Color VGA card/1MB RAM (32,000+ colors)!**
- **ZEOS 14" 1024x768 Non-interlaced VGA Color Monitor w/Tilt & Swivel.**
- **Lotus 1-2-3 for Windows, Ami Pro 2.0, Microsoft Windows, DOS 5.0 *plus* a Microsoft mouse!**

PACKAGE #3

THE ULTIMATE ZEOS PACKAGE #4

Now, Memory goes to 8MB and the drive to 210MB. The ultimate Power User's Dream Machine!

- **8 full Megabytes of High Speed RAM.**
- **Your screaming 210MB IDE hard drive with its own built-in cache.**
- **Teac® 1.2 & 1.44MB FDD'S!**
- **Diamond SpeedStar Hi-Color VGA card/1MB RAM (32,000+ colors)!**
- **ZEOS 14" 1024x768 Non-interlaced VGA Color Monitor w/Tilt & Swivel.**
- **Lotus 1-2-3 for Windows, Ami Pro 2.0, Microsoft Windows, DOS 5.0 *plus* a Microsoft mouse!**

PACKAGE #4

ORDER NOW TOLL FREE
800-423-5891

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GSA# GSA00K91AGS5176
Open 24 Hours a Day, 365 Days a Year!

Why ZEOS is

CHECK YOUR EXCLUSIV

If you're deciding which new computer to buy, there are many important considerations.

Here, we've gathered together a number of these considerations for your review. Some are of obvious importance,

ZEOS. Eight Times Editor's Choice.

- ☑ Now, your ZEOS modular system allows you to upgrade from one CPU to another as your computing requirements change. Obsolescence is virtually obsolete!
- ☑ You may choose between a variety of '386 and '486 processor options, both cached and non-cached.
- ☑ Made in USA! Your new ZEOS system boards are designed and manufactured by ZEOS, right here in the USA.
- ☑ ZEOS has utilized the very latest in highly integrated surface mount technology. Faster, cooler, more reliable systems for you!
- ☑ Every ZEOS modular system comes standard with *incredibly fast* Zero-Wait *RAM*.
- ☑ Plus, you may expand your system with up to 32 megabytes of memory right on the motherboard.
- ☑ Your new system features the *exclusive* ZEOS seven bay desktop case, smaller than most five bay cases yet plenty of room for future expansion.
- ☑ Two whisper quiet cooling fans move more cool air thru your system increasing reliability and component life.
- ☑ Your *entire* system is UL® listed (not just the power supply). Few others offer this security; we wonder why.
- ☑ Eight slots, one for the video, seven more open providing plenty of room as your system requirements grow.
- ☑ Two high speed serial ports, one parallel port and one game port.
- ☑ Our top quality 300 watt power supply provides you with plenty of power for your present *and* future needs.
- ☑ ZEOS uses *only* genuine Teac® floppy drives. Accept nothing less.
- ☑ Monochrome TTL systems feature Genuine Hercules® brand graphics controllers. Only the best for you.

Your #1 Choice!

ZEOS ADVANTAGES:

while others are subtle yet critical to your ultimate satisfaction. We'll go over them here with you one by one.

Please feel free to use these as a basis for comparison with other system vendors. We believe you will come away with the conclusion that *ZEOS is indeed Your #1 Choice.*

✓ VGA color systems feature the high-res ZEOS 1024x768 Non-interlaced monitor with the incomparable Diamond SpeedStar Hi-Color card with 1MB RAM and Sierra DAC (32,000+ colors)!

✓ Special package savings are available incorporating our most popular upgrades. Many packages include Microsoft® DOS plus Windows and a Mouse!

✓ For a limited time every ZEOS Windows system also comes with Lotus *1-2-3 for Windows* plus Lotus' incredible new Windows word processor *Ami Pro 2.0!*

✓ *PC Magazine* said ZEOS offers "more options than even the most configuration hungry hound could possibly need." Let us build whatever you require.

✓ Everybody loves ZEOS' 24 Hour a Day Toll Free Technical Support. You can call for advice any time of the day or night, 365 days a year!

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A married person may apply for individual credit. I am applying for (please check appropriate box):

☐ **JOINT CREDIT** with another person. Complete entire application.

☐ **INDIVIDUAL CREDIT** but rely on income or assets of another person as a basis for repaying the credit requested. Complete entire application.

☐ **INDIVIDUAL CREDIT.** Do not complete Section C.**

**If you are a married Wisconsin applicant, you must provide your spouse's information as indicated, even though your spouse may not be signing the contract.

NOTICE TO WISCONSIN APPLICANTS: YOU MUST DISCLOSE YOUR MARITAL STATUS:

☐ married ☐ unmarried ☐ legally separated

A. YOUR PERSONAL INFORMATION

Name _____

Home Phone (_____) _____

Soc. Sec. No. _____ Date of Birth ____/____/____

Address _____ Apt. _____

City _____ State _____ Zip _____

Since? (Mo./Yr.) _____ ☐ Buy ☐ Rent ☐ Other _____

Previous Address _____

City _____ State _____ Zip _____

Employer _____ Since? (Mo./Yr.) _____

Monthly Gross Salary $ _____ Daytime Bus. Phone (_____) _____

Previous Employer _____ _____ From - To

Occupation _____

Income from alimony, child support or separate maintenance payments need not be disclosed if you do not wish to have it considered as basis for repaying this obligation.

Additional Monthly Income $ _____ Source: _____

Name & Address of Nearest Relative Not Living With You _____

_____ Relationship _____

B. CREDIT INFORMATION

PLEASE TELL US IF YOU HAVE: Checking Account ☐ Yes ☐ No
Savings Account ☐ Yes ☐ No

	Y/N	How Many?		Y/N	How Many?
Bank Loan	___	_____	Dept. Store Charge Card	___	_____
VISA	___	_____	Credit Union Account	___	_____
MasterCard	___	_____	Other Major Charge Cards	___	_____
Finance Company Loan	___	_____			

C. JOINT APPLICANT INFORMATION

Joint Applicant's Name _____

Soc. Sec. No. _____ Date of Birth ____/____/____

Address _____ Apt. _____

City _____ State _____ Zip _____

Home Phone (_____) _____ Date of Residence _____ (Mo./Yr.)

Joint Applicant's Employer _____ Since? (Mo./Yr.) _____

Bus. Phone (_____) _____ Monthly Gross Salary $ _____

CUSTOMER AUTHORIZATION

I authorize ZEOS International, Ltd. or its assignees to investigate credit records and to report my performance hereunder to credit agencies. I hereby certify that the following information is furnished to you for the purpose of obtaining credit and is true and correct to the best of my knowledge and belief.

Applicant's Signature _____

Date _____

Joint Applicant's Signature _____

Date _____

FOR MARRIED WISCONSIN APPLICANTS:
I acknowledge that the obligation described herein is being incurred in the interest of my marriage or family.

Buyer's Signature _____ **Date** _____

There are costs associated with the use of this credit card. To obtain more information about these costs, call us at 800-421-8942 or 612-635-0613 or write to ZEOS, Z•Card Processing Center, 530 5th Avenue N.W., St. Paul, MN 55112.

NY—A consumer credit report may be requested in connection with this application or in connection with updates, renewals or extensions of any credit granted as a result of this application. If I subsequently ask for this information, I will be informed whether or not such a report was requested and, if so, the name and address of the agency that furnished the report.

OH—THE OHIO LAWS AGAINST DISCRIMINATION REQUIRE THAT ALL CREDITORS MAKE CREDIT EQUALLY AVAILABLE TO ALL CREDITWORTHY CUSTOMERS AND THAT CREDIT REPORTING AGENCIES MAINTAIN SEPARATE CREDIT HISTORIES ON EACH INDIVIDUAL UPON REQUEST. THE OHIO CIVIL RIGHTS COMMISSION ADMINISTERS COMPLIANCE WITH THIS LAW.

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When you buy ACT-Plus, you get all the features you need to do full-scale business accounting. With other similarly priced packages, you get a basic accounting program, but you don't get the power, flexibility, or functionality of ACT-Plus. So, if you want to do full-scale business accounting with other systems, you have to spend thousands more for expensive add-on features.

Look at the comparison below. We took the information from the Peachtree Times Newsletter in which Peachtree informed its customers of third party add-ons available for their software. These add-ons are not available from Peachtree, nor are they guaranteed by Peachtree, but they are expensive. Most of the add-ons in Peachtree's newsletter are standard features in ACT-Plus. We listed and added up the cost of the add-ons that are free in ACT-Plus. As you can see, you would have to pay over $6,900 to make Peachtree do what ACT-Plus does.

Standard ACT-Plus Features FREE!!! No Additional charge	Add-on Cost for Peachtree	Standard ACT-Plus Features FREE!!! No Additional charge	Add-on Cost for Peachtree	Standard ACT-Plus Features FREE!!! No Additional charge	Add-on Cost for Peachtree
Range of accounts in trial balance.	$99.00	Easily edit large invoices	$99.00	AR automatic transaction weekly	$99.00
Income Statement revision	$79.00	Concise picking list	$99.00	AR ship to address	$99.00
Default amount to zero	99.95	Change bill to I.D.	$99.00	No aging on current statement	$99.00
Center titles on Income Statement	$99.00	Enter invoice to ask for job number	$350.00	Additional shipping address	$149.00
Subsidiary Schedule Account Titles	$99.00	Eliminate YTD fields on check stubs	$99.00	Short invoice format	$99.00
Suppress zero balance accounts	$99.00	Remove pay rate from check stub	$99.95	Labels AR and sales invoice	$99.00
Account range totals	$99.00	Print name and address on check stub	$99.95	Change invoice date	$99.00
Single spacing on Check Register	$79.00	Manual payroll checks	$99.00	Post all or range of invoices	$99.00
Left justified narrow amount on check	$49.00	3-character product code	$149.00	Net amount print	$99.95
AR aging report with 91 column	$99.00	Use history for check register	$75.00	Import sales invoices	$199.00
AR customer file expansion	$149.00	GL Transaction import	$199.00	Sales invoice message	$99.00
AR aged record report with variable sort	$99.00	Default detail trial balance	$69.95	Update on auto invoices	$99.00
Service charge by percentage or amount	$49.00	Print negative amounts in parentheses	$99.00	Change ship to I.D.	$99.00
AR statement blank reference	$99.00	Enhanced income statement	$99.00	Pay stubs with rates and hours	$99.00
Sort AR aging report by customer name	$99.00	Suppress zero balance accounts	$99.00	Automatic tax deduction per hours	$149.00
Default to YES for print invoice	$79.00	Department titles and totals	$99.00	Payroll check export program	$99.00
Sales invoice with qty, description, price	$99.00	Processing of hand checks	$99.00	Void payroll check	$99.00
Insurance company invoice format	$149.00	No check number on checks	$79.00	Discount on purchase order	$99.00
Monthly invoice register	$99.00	Multiple default GL accounts	$99.00	Import inventory items	$199.00
Delete previously posted invoices	$99.00	AR statement without aging	$79.00	Uses history for employees	$75.00
Post comments to AR	$99.95	AR transaction import	$199.00		
Print description and amount	$99.95	AR aging and past due report	$65.00	**Total**	**$6931.65**

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Price	*$199.50*
Add-ons	*0.00*
Final Cost	***$199.50***

Peachtree's accounting package after intensive third-party beefing-up. Still not equal to ACT 1-Plus for power, functionality, or integrity.

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UPDATE

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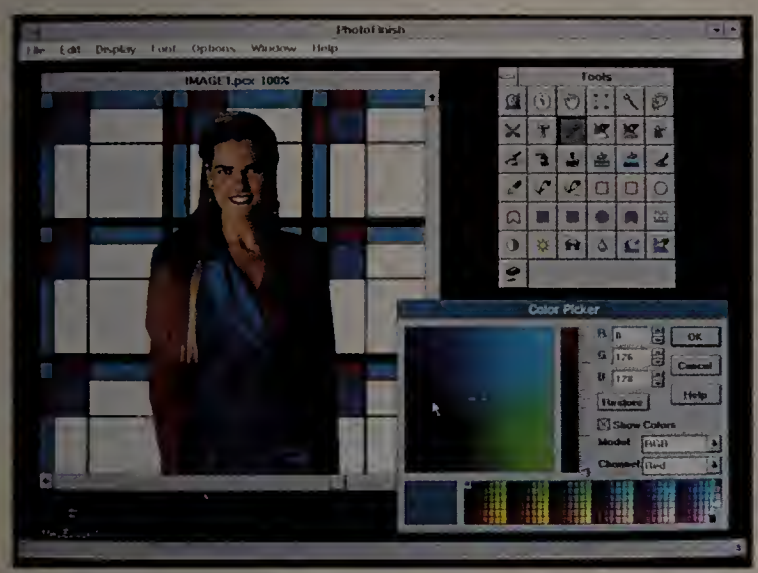

Designed for business users who want to import photo-realistic images into graphics, ZSoft's PhotoFinish sports a full palette of editing tools and simple English commands.

ZSoft's *PhotoFinish* follows the trend of "downsizing" applications. This slightly slimmer version of *Publisher's Paintbrush*, a $495 paint package, is a steal at only $199. No lightweight in its own right, *PhotoFinish* is designed for business users—not graphic artists or professional photographers—who want to import photo-realistic images into their business graphics. As a result, ease of use is paramount: Many *PhotoFinish* options feature simple English commands, such as "heighten shadow" or "darken outline," instead of the often-confusing numerical and palette calibration terminology used in more advanced paint packages. Like *Publisher's Paintbrush*, *PhotoFinish* supports 24-bit color. ZSoft Corp., 450 Franklin Rd. #100, Marietta, GA 30067; 404/428-0008.

Reader service no. 772

ReadRight for DOS

ReadRight for DOS, an upgrade of *ReadRight 2.01*, offers improved OCR accuracy (the company claims 99.9 percent accuracy for just about any font) as well as a variety of new features, such as page decomposition, in which the program automatically separates text and graphics on a page for quicker recognition. *ReadRight for DOS* also features a new toolbox that enables you to select specific text blocks. Also new are a pop-up error checker and a graphical interface with pull-down menus, keyboard shortcuts, and built-in dictionaries. *ReadRight for DOS* costs $495. Upgrades are $99, but users who purchased a copy of *ReadRight 2.01* after October 1, 1991, can receive a free upgrade with proof of purchase. OCR Systems, 1800 Byberry Rd. #1405, Huntingdon Valley, PA 19006; 800/233-4627, 215/938-7460.

Reader service no. 773

WinRIX

WINDOWS *WinRIX* ($495) is the *Windows* version of *ColoRIX VGA Paint*. This paint program lets you create and edit both 15-bit (32,768 colors) and 24-bit (16.8 million colors) images. It is also compatible with standard 256-color VGA displays, and combines bit-mapped and vector image creation. *WinRIX* retains the pop-up menu structure of *ColoRIX VGA Paint*, but also features new drop-down menus familiar to *Windows* users. Image-editing tools in *WinRIX* include process filters for enhancing images with sharpening and softening, darkening and lightening, smudging, blurring, and tinting. RIX SoftWorks, Inc., 18552 MacArthur Blvd. #200, Irvine, CA 92715; 800/345-9059, 714/476-8266.

Reader service no. 774

R:base/V

Microrim's *R:base/V* lets you transparently access and manipulate data from *Oracle*, *RdB*, and *Ingres* DBMS servers running under Digital Equipment Corporation's VAX/VMS operating system. As your front end, the product gives you real-time read/write capabilities using a broad range of PC DBMS tools, including query, browse, and edit plus form and report creation. Microrim, 15395 S.E. 30th Pl., Bellevue, WA 98007; 800/628-6990, 206/649-9500.

Reader service no. 775

Adobe Type Manager 2.0 for Windows

WINDOWS *ATM*, the font utility voted most likely to be bundled with other applications, has beefed up performance with version 2.0. The main story is speed: On 386- and 486-based PCs, version 2.0 will produce fonts twice as fast as its predecessor.

The new version—which, like the previous one, comes with Times, Helvetica, Courier, and ITC Symbol—promises to be equally compatible with upcoming *Windows 3.1*.

Printer support has also been enhanced. For instance, *ATM* now automatically downloads newly installed fonts to a PostScript printer, and for the LaserJet III, *ATM 2.0* speeds print time by deferring to printer-resident HP scalable fonts of the same name. The $99 *ATM 2.0* is available to registered *ATM 1.0* owners for $20 (plus $7.50 shipping and handling). And when you upgrade, you can get any Adobe font for $39. Adobe Systems, Inc. 1585 Charleston Rd., P.O. Box 7900, Mountain View, CA 94043; 800/833-6687, 415/961-4400.

Reader service no. 776

CA-Cricket Presents 1.4

WINDOWS Computer Associates has upgraded its *CA-Cricket Presents* with an improved tool palette, greater speed, and the capability to halt screen redraw in mid-repaint. Version 1.4 of the *Windows* presentation package also includes a 100,000-word spelling checker and thesaurus and a generous selection of templates. *Cricket Presents* features an outliner,

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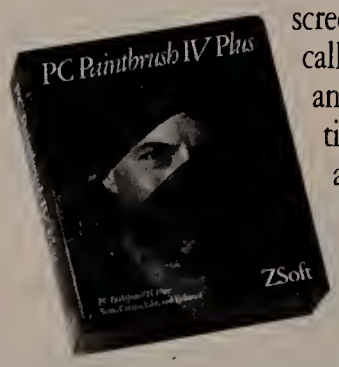
Make Your Photos Come Alive...Bring photographic quality gray scale images into all your presentations and documents quickly and easily. Automatic filters save you endless hours of retouching. Use them to adjust brightness and contrast, sharpen edges, equalize intensities, remove spots and coarseness, or pixelate for a contemporary, mosaic look. Fine tune select details with manual tools that blend, lighten, darken, smudge, tint, and adjust contrast for exactly the look you want. PC Paintbrush IV Plus™ is easy to use—with pull down menus, customizable screen layout, graphically labeled options, and context sensitive help. And it's affordable—only $199! Call us today.



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Sales Department

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Paintbrush is a registered trademark and PC Paintbrush IV Plus is a trademark of ZSoft Corporation

Circle 321 on reader service card

2001 DataDream

What weighs under 3 pounds, runs on four AA batteries, and features Lotus Works in ROM? It's the 2001 DataDream, an ultralight notebook that's an easy haul through airports.

This 3-pound, XT-compatible subnotebook PC from Computer Friends carves out a niche between the featherweight HP 95LX palmtop and 6-pound-plus notebooks. The 2001 DataDream features a thin, lightweight design and comes bundled with the *Lotus Works* program. The company claims a battery life of 30 to 40 hours on four standard AA-size batteries. The DataDream comes equipped with a nonbacklit, 80-column by 25-line LCD display, DR DOS 5.0 in ROM, and two PCMCIA memory card slots. Ports include parallel, serial, and RGB (CGA resolution). The 2001 DataDream comes in two configurations: $799 with 512K DRAM (and an additional 128K SRAM card), or $999 with 1MB DRAM. Computer Friends, Inc., 14250 N.W. Science Park Dr., Portland, OR 97229; 800/547-3303, 503/626-2291.

Reader service no. 779

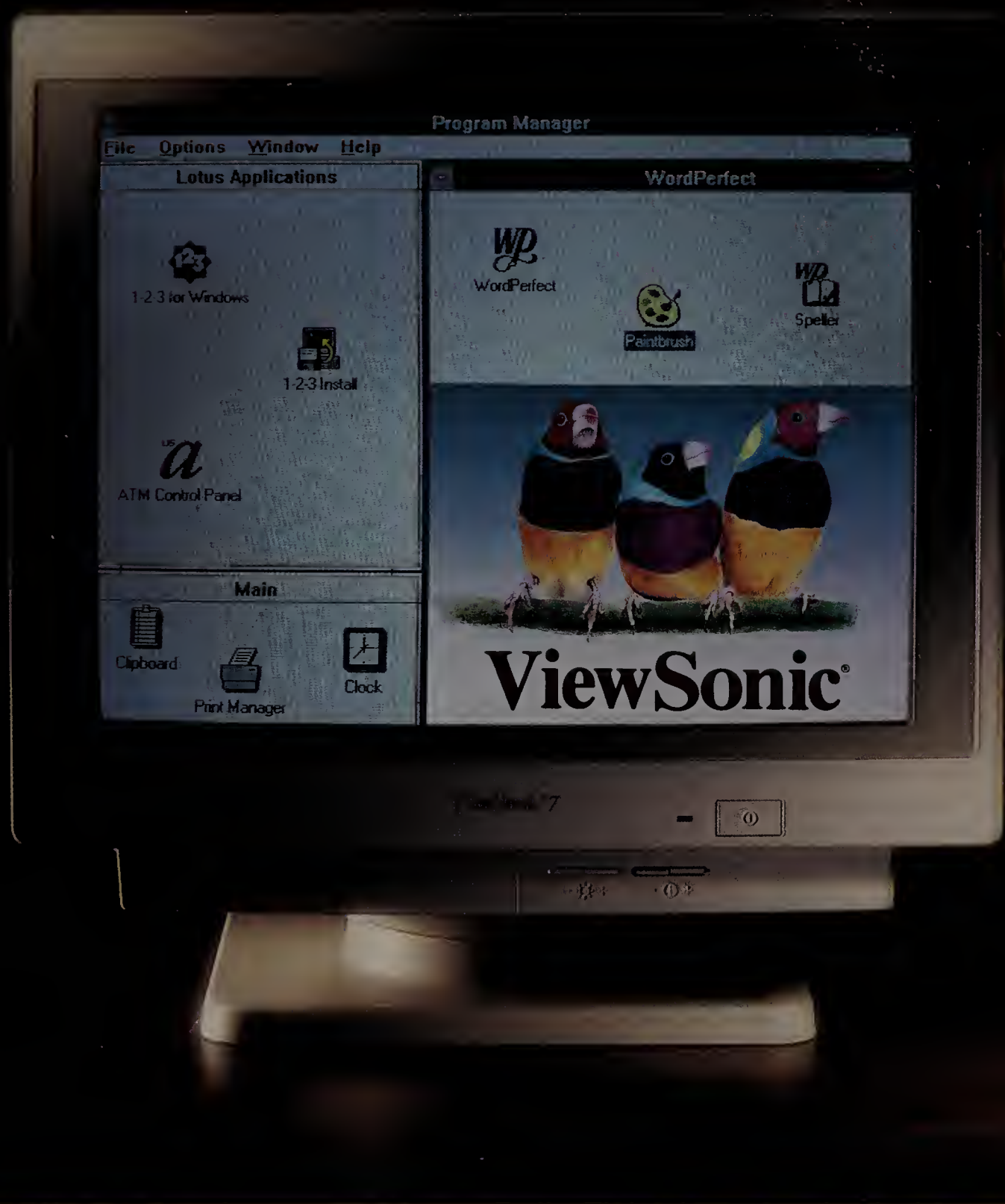
speaker note generation, and thumbnail presentation views. *CA-Cricket Presents 1.4* costs $199, and upgrades are $49. Computer Associates Int'l, Inc., 1 Computer Associates Way, Islandia, NY 11788-7000; 512/342-6000.

Reader service no. 777

PageAhead 1.1

WINDOWS You don't need *PageMaker* anymore in order to do great-looking data reports with *PageAhead*. With version 1.1 of this data base query program, you can send the results of your *dBASE* and *Oracle* queries into *Microsoft Word for Windows* or *WordPerfect* (for either DOS or *Windows*) and to any program that can read delimited ASCII or RTF files. As with the original release, *PageAhead 1.1* gives you a graphic query-by-example tool for pulling complex, relational information out of your data bases with a minimum of technical know-how. Once you have your data, you can perform

Big Screen for Windows



No question... this 17-inch monitor from ViewSonic is the ideal "big screen" choice for Windows. In fact, in a recent InfoWorld product comparison, the ViewSonic 7 was rated #1. Our monitor was designed for people who know what they want and won't accept second best.

The competition claims we're unfair. That's because the up-graded ViewSonic 7, with resolution up to 1280 x 1024, features microprocessor-based memory along with 26 programmable preset modes. And it has a flat square, anti-static screen to eliminate distortion and provide a sharp to-the-edge picture. Plus, for a flicker-free image, it boasts of ultra-high 76Hz refresh rate. This monitor even meets low-radiation strict Swedish MPR-2 standards!

ViewSonic 7—the ideal 17" big screen monitor for the full-scale Windows environment.

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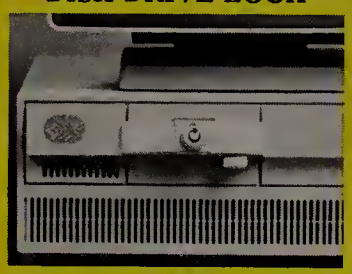

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PC WORLD

initial formatting in *PageAhead*, then go to *PageMaker* or your word processor for more formatting. *PageAhead 1.1* lists for $795. Upgrades are free. PageAhead Software, 2125 Western Ave. #301, Seattle, WA 98121; 800/967-9671, 206/441-0340.

Reader service no. 778

New Driver for Microsoft Mouse and BallPoint Mouse

Microsoft has released an updated software driver for its Microsoft Mouse and BallPoint Mouse. Version 8.1 works with any Microsoft Mouse–compatible input device and is specifically designed to reduce the eyestrain and frustration of notebook and laptop users who find cursor visibility and tracking a problem. The new driver displays a control panel that lets the user choose the size of the cursor—small, medium, or large—and three colors. The panel features an adjustable switch for enlarging the cursor. The new driver is free to BallPoint Mouse owners and anyone upgrading from version 8.0.; the cost is $25 to all others. Microsoft Sales and Service, One Microsoft Way, Redmond, WA 98052-6399; 800/426-9400.

Reader service no. 849

Corel Draw CD ROM Blockbuster

Corel Systems is shipping Blockbuster, a competitive upgrade package that includes an internal Toshiba CD ROM drive. You also get *Corel Draw 2.0* on CD; 10,000 clip art images; 450 classic works of literature; a CD of the winning designs from last May's *Corel Draw* World Design competition (including dissections of the drawings so you can see how the artists made them and create some yourself); a coffee table book of the winning designs; more than 200 fonts (52 more than the current 2.0 version of *Corel Draw*); and a series of classical music clips with a home-receiverlike software control interface. You get the whole bundle for $595 (with an external drive, it's $695) plus the first page of the manual from a competing product such as *Adobe Illustrator* or *Micrografx Designer*. The package retails for $1295 with an internal drive, $1395 with an external drive. Corel Systems Corp., 1600 Carling Ave., Ottawa, Ontario, Canada K1Z 8R7; 613/728-8200, 613/728-9790 (fax).

Reader service no. 850

CompuServe Flat-Rate Pricing

The CompuServe Information Service is now offering its most popular services for a monthly fee of $7.95. These services include CompuServe mail (you can send up to 60 three-page E-mail messages and read incoming mail free, except for Internet mail). The flat-rate pricing covers 30-plus services, including Associate Press news summaries; stock quotes; customer service; and five games, including CastleQuest and Black Dragon. Current CompuServe members may convert to the new flat-rate pricing but are not required to convert, company officials say. New members who sign up for the flat-rate service will get one month of free usage. New members can also select pay-as-you-go pricing, which remains at $2 per month plus charges for services used. CompuServe, Inc., P.O. Box 20212, Columbus, OH 43220; 800/848-8199.

Reader service no. 851

For more information about any product, contact the manufacturer or circle the number on the reader service card.

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PC PRICE WAR: 486SX VS

AT LAST, YOU HAVE A CHOICE. SYSTEMS WITH AMD'S 40-MHZ 386 OFFER MORE POWER PER DOLLAR THAN THOSE USING INTEL'S 486SX — BUT WHICH OFFER THE BETTE UPGRADE PATH?

386/40

BY REX FARRANCE
AND MICHAEL GOODWIN

You must have noticed. For months, countless PC advertisements have carried a seal proclaiming "Intel inside." Besides telling you that the advertised PC has an Intel processor, what's the meaning of this emblem?

It means war—and ultimately lower hardware prices for you. Intel has waged its "inside" campaign because, for the first time since the PC was introduced ten years ago, the giant chip maker faces strong competition. American Micro Devices has done an excellent job of cloning the 386 processor; by all accounts (including our Test Report in this review) AMD's Am386DX chip displays no compatibility problems whatsoever. Moreover, AMD's hot 40-MHz Am386DX, which is used by 10 of the 25 systems evaluated here, is more than 20 percent faster than any Intel 386.

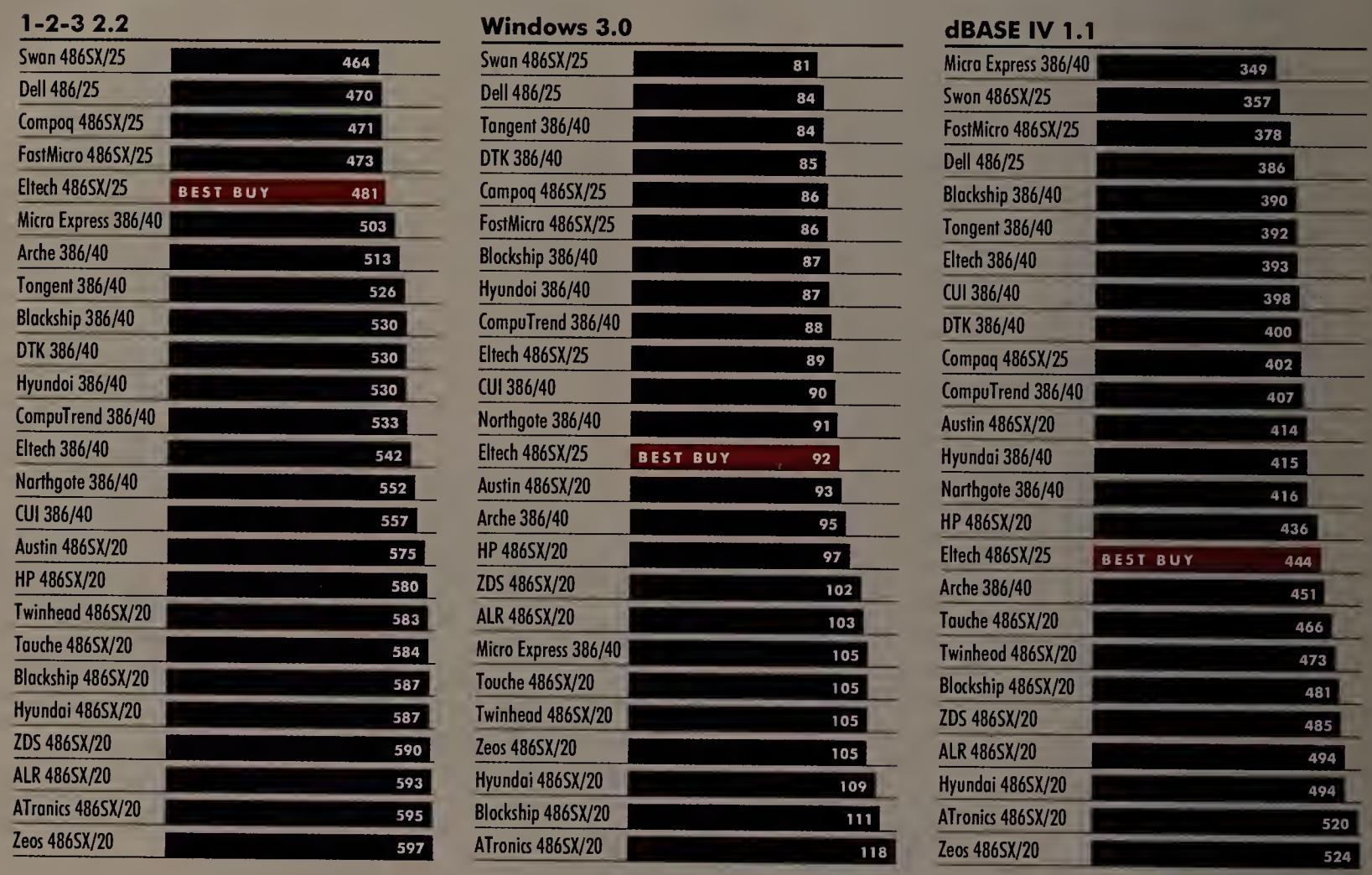
Responding to this challenge, Intel has lowered

PHOTOGRAPHS BY ROBERT CARDIN

PC WORLD TEST REPORT

386/40s Nip at the Heels of 25-MHz 486SXs

On average, 25-MHz 486SX systems, such as our performance winner from Swan and our Best Buy from Eltech, beat the 386/40s, but not by much—three of the eight systems that won four stars for performance were 386s.



prices on its heir apparent to the 386, the 486SX, and these cost savings are already being passed on to you. The ten 20-MHz 486SX systems in this review average hundreds of dollars less on the street than those we evaluated only three months ago. [At press time prices were dropping even more on some systems. So if you're shopping for the lowest price, it's worth making a few extra inquiries before buying. —*Ed.*]

Nonetheless, the AMD 386 systems are cheaper still—about $800 less than the 20-MHz 486SXs reviewed here—and they offer about 12 percent faster processing! You'll have to buy at least a 25-MHz 486SX to beat the processing punch of a 40-MHz Am386DX system, and judging by the five 25-MHz 486SX systems reviewed, you'll pay an average $1200 more for the privilege.

You can be sure that the price gap will narrow further as 486SX prices continue to fall. But is price the only battlefield in this war?

Dueling Upgrades

"Intel inside" suggests Intel systems offer something extra. In fact, they do—or soon will. Any 486SX with a processor upgrade socket designed to accept the 487SX "coprocessor" can accommodate one of the cleverest upgrades yet, Intel's "clock doubler" chip.

Pop in one of these double-speed CPUs, expected to ship by mid-1992, and your 20-MHz or 25-MHz 486SX system will run as if the CPU were zipping along at 40 or 50 MHz. Intel claims performance with real applications will be only about 50 percent faster, but at $300 to $350 per chip (for an SX), this upgrade scheme is the most affordable yet. Clock-doubler chips will also be available as replacements for 25-MHz and 33-MHz 486DXs.

Who knows what AMD may come up with in response? It's clear, in any case, that none of the current batch of AMD 386s can be upgraded—at the chip level, that is. Several AMD-based systems let you upgrade more conventionally by removing the existing processor board and plugging in a new one. You

Paradox 3.5

Arche 386/40	417
Micro Express 386/40	444
Touche 486SX/20	444
FastMicro 486SX/25	489
Austin 486SX/20	513
Tangent 386/40	516
Swan 486SX/25	519
ZDS 486SX/20	560
HP 486SX/20	563
ALR 486SX/20	572
Compaq 486SX/25	588
CompuTrend 386/40	593
DTK 386/40	594
Dell 486/25	595
Eltech 386/40	602
Blackship 386/40	608
CUI 386/40	614
Eltech 486SX/25	BEST BUY 614
Blackship 486SX/20	621
Hyundai 386/40	624
Twinhead 486SX/20	629
Hyundai 486SX/20	631
Zeos 486SX/20	658
Northgate 386/40	660
ATronics 486SX/20	692

WordPerfect 5.1

Swan 486SX/25	44
FastMicro 486SX/25	46
Touche 486SX/20	46
Arche 386/40	47
Compaq 486SX/25	47
Dell 486/25	47
Austin 486SX/20	49
HP 486SX/20	49
Micro Express 386/40	49
Tangent 386/40	49
Eltech 486SX/25	BEST BUY 50
ALR 486SX/20	51
ZDS 486SX/20	51
Blackship 386/40	52
CompuTrend 386/40	52
Blackship 486SX/20	53
CUI 386/40	53
Eltech 386/40	53
Hyundai 486SX/20	53
Twinhead 486SX/20	53
DTK 386/40	54
Hyundai 386/40	54
Northgate 386/40	54
Zeos 486SX/20	54
ATronics 486SX/20	57

Time in seconds.

Methodology
We tested all the computers with 4MB RAM except the ALR 486s/20 and Twinhead 486s/20, which had 5MB RAM. The systems' hard disk size ranged from 80MB to 210MB. We used the vendor's version of DOS 5.0 or Microsoft DOS 5.0.

1-2-3 2.2
We load the application, followed by three separate worksheets (arithmetic, financial, and scientific). We make various changes and run recalcs on each. Finally, we use the *MAPS* add-in from Management Advisory Services of Seattle to run a number of financial forecasts.

Windows 3.0
Timing begins and ends at the DOS prompt. We launch Windows along with a macro that loads *Microsoft Excel* with a financial worksheet and initiates a recalc. Then the macro loads Lotus's *Ami Pro* along with a 50K document that contains a 500K TIFF image. Finally, the macro launches *Micrografx Designer*, opens a drawing, displays it on screen, and exits to DOS.

dBASE IV 1.1
With the caching feature enabled, we complete an unindexed search for a single record in a 100,000-record parts table. Then we index the table, run the transaction processing module, and post 600 records.

Paradox 3.5
Starting with an orders table, we compare each record with an available stock table. The application finds the current price for the items and inserts the resulting record into an invoice table.

WordPerfect 5.1
We reformat three *WordPerfect 5.1* documents that vary in size from 5K to 55K. The files are text with some boldface and underlining. One document includes a TIFF image.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

can move up to a 50-MHz 486DX if you're willing to pay (see "Intel's Instant Upgrade Plan" for more details).

Full Speed Ahead

Neither 486SX nor 386/40 systems are thoroughbreds —more powerful 486DX machines running at 25, 33, or 50 MHz are smarter choices for CAD work or for use as file servers on large networks. But they're no laggards either. Compared with 386SXs, a 486SX or a 386/40 makes quick work of recalculating a large spreadsheet and editing a complex graphics file. In short, these systems make great business workstations, and the machines that can be sensibly upgraded should extend their usefulness for years.

Eight of the 25 systems reviewed here delivered four-star performance—three 386/40s and five 25-MHz 486SXs. The 486SX/25 from Swan was the fastest machine overall, but Micro Express's ME 386-40 made a strong showing too, beating several 25-MHz SXs to skip into third place. Our Best Buy, Eltech's Model 4200, combines excellent 25-MHz 486SX performance with one of the lowest street prices in the roundup: a breathtaking $1964.

Eltech, which has recently earned two Best Buys—its 25-MHz 386SX Model 9870 won the honor in October 1991, and its 20-MHz 386SX Model 2200 took a top slot in January—is emerging as an innovative and reliable vendor. It's one of the smaller companies that have shown impressive systems and customer support in the last year.

Nobody said shopping for a system is easy. But with great bargains in both competing platforms, you should be able to find the desktop of your dreams.

Rex Farrance is an assistant editor and Michael Goodwin an associate editor for PC World. *San Francisco freelance writer Nat Friedland contributed to this article.*

For more information about all products in this article, circle reader service no. 904.

ALR BusinessStation 486ASX

PROS: EISA motherboard, easy upgrade path, good support
CONS: Expensive, stingy slot count

The $3557 ALR BusinessStation 486ASX competes at the low end with ALR's own BusinessVEISA 486ASX, reviewed last December—the fastest 20-MHz 486SX we've tested. The BusinessStation ranks with the slower systems in this roundup, even though it's fourth most expensive.

We tested the unit with its 200MB IDE drive. If you add $895 for ALR's 32-bit EISA cache controller, you'll get better disk performance, but that won't help its *1-2-3* scores. You *can* improve processing speed by swapping to a 25-MHz 486DX for $1000 with ALR's chip-only upgrade or to a 33-MHz 486DX for $1800 with a new CPU board. If high EISA throughput leads you to consider the BusinessStation as a server, think again: Three free slots and three drive bays leaves too little expansion capacity. Add one of the DX options and a cache controller, and you'll have one heck of a workstation or desktop, but at a premium price.

With limited slots and bays, the 486ASX is only so-so as a stand-alone, but this EISA system could be good on a LAN.

Scorching performance and upgradability too—that's the payoff with Arche's costly Master 386/40.

Arche Master 386/40

PROS: Fast, upgradable, two years of on-site service
CONS: Expensive

It's hard to believe a 386 can go this fast. Thanks to a 128K memory cache and caching disk controller, the Arche Master 386/40 is one of the speediest machines in the roundup. It ripped through our *Paradox* test and posted impressive results on *WordPerfect* and *1-2-3*. If its performance resembles that of a 486SX/25, however, so does its price: At $2994, the Master is the most costly 386/40 here.

If you decide you want even faster performance, you can slip in a 33-MHz 486DX processor card, but at $1700 it's not cheap. Arche gives a choice of chassis: The compact we reviewed is less roomy than most, with four free slots and three drive bays, but the full-size model adds two internal drive bays. Both chassis have a handy LED indicator for emergency diagnostics. Top-notch support includes 24 months of on-site service. All this adds up to a great choice, if you're willing to pay for it.

ATronics ATI 486SX/20

PROS: Inexpensive, lots of slots and bays, removable drive option, upgradable
CONS: Slow, case is hard to open

The $1195 price is spectacular, but the ATronics ATI 486SX/20 is the second-slowest system we benchmarked. Still, there's plenty to recommend this 20-MHz minitower. Its expandability is outstanding: five drive bays and seven free slots, plus a socket that accepts a 20/40-MHz clock doubler. ATronics also added thoughtful touches like an LED diagnostic readout and labeled ports. Security-conscious buyers can spend an additional $69 for a removable hard disk, and if you can keep the big boss from spotting your joystick, you might like the standard game port. But the heavy case cover tends to bind and is hard to take off.

Service and support rates high, with a year's free on-site service. Bargain hunters looking for security and expandability may want to pick up an ATronics now and hope that a $300 clock doubler can turn this bargain slowpoke into a nicely priced speed demon.

This inexpensive, upgradable minitower is on the slow side, but its device capacity is exceptional.

Buying Smart: Stalking the Well-Crafted Desktop

Once you could tell a system by its clock speed: 33-MHz 386s were twice as fast as 16-MHz machines, and that was that. With 25-MHz 486SX systems edging aut 40-MHz 386s, easy answers no longer prevail. But the basic questions, as always, are how fast does a system run actual applications, and how much are you willing to pay?

PERFORMANCE

All these systems are fast, but the hottest among them are the 25-MHz 486SXs. You'll find significant differences, machine to machine, depending on peripheral performance. If you use a data base program such as *dBASE*, you'll benefit from a speedy hard drive and controller. If you're doing desktop publishing or presentations, think about a fast video card with a graphics coprocessor. Using our weighting system, which places the greatest emphasis on *1-2-3* benchmarks and least on data base tests, the overall performance winner is the Swan 486SX/25.

PRICE

We base cost comparisons on street prices of units set up in a standard configuration: 4MB RAM, 90MB to 125MB hard disk, 1.2MB or 1.44MB floppy drive, VGA and calor display, one parallel port and either two serial ports or ane serial port and one mouse port, keyboard, mouse, and DOS 5.0. For all systems (except thase that are sold direct), we call at least three PC dealers in each of eight major cities across the country to get price quotes and average the results for each system. CompuTrend's 386/40 is the most affordable of all.

SERVICE AND SUPPORT

Look for a machine with at least a one-year warranty and a support phone number. We test technical support by calling central support, asking three questions of varying difficulty, and rating responses on promptness, courteousness, and accuracy. Then we factor in free on-site service, toll-free phone support, fax lines, and so on. We rate dealer support by looking at the vendor's policies on dealer training, inventory, and support staff. Swan's 486SX/25 has the top service and support .

DESIGN AND CONSTRUCTION

The most important design consideration is whether the machine works well in your environment. To make sure your system supports the usual software and peripherals, we run these PCs through tough compatibility tests. But erganomic details count, too. Be sure the keyboard is comfortable and the monitor is easy on the eyes. If noise is a problem, listen before you buy, as some of these powerhouses are more than loud enough to upset a librarian. The power switch, reset button, and floppy drive(s) should be easily accessible, and getting under the hood shouldn't send yau searching for your toolbox. The Campaq Deskpro 486s/25M and the ZDS Z-486SX/20E tied for best design.

EXPANDABILITY

The key issue here is a CPU upgrade path—or lack thereof (see "Intel's Instant Upgrade Plan"). Board upgrades give best performance far highest cast. Chip upgrades, like those using Intel's clack-doublers, cost less and have a lower performance ceiling.

A system needs enough slats and drive bays to last its useful life—but what's enough? If you plan to hook the computer up as a netwark workstation, you'll be able to access the file server and probably get by with three bays—one internal and two externally accessible—adequate for a hard and floppy drive and a tape backup or CD ROM. But for a standalone PC or file server, loak for at least one more bay.

Four free expansion slots is usually plenty, but five is even better—especially if your system can't call on shared network resources. You may need slots for network boards, fax-modems, sound boards, or SCSI adapters. What kind of slots are best? Neither Micro Channel nor EISA has taken the world by storm, but these fast 32-bit buses can deliver speed advantages if you plan to use a high-perfarmance 32-bit network board or drive controller.

FAST-RAM CAPACITY

With this crop, you won't have to worry about having memory to handle future applications. All the 486SXs accommodate at least 32MB af fast RAM (which runs at the same speed as the CPU), and the 386/40s suppart a minimum 16MB. Since only UNIX, or NetWare 386 and a big, busy netwark, rautinely take advantage of anything over 16MB, all the systems win 4-star ratings. But if yau want ta plan far the future, including 32-bit versions of OS/2 and *Windaws*, the greater RAM capacity, the better. More than a third af these systems can top aut at 64MB of fast RAM.

Austin WinStation 486SX/20

PROS: Fast, plenty of slots and bays, clock doubler upgrade, very good support
CONS: Fairly expensive

By and large, you'd expect a 20-MHz system to run slower than a 25 or a 40, but the 20-MHz Austin WinStation is full of surprises. It turned in unexpectedly fast benchmarks, especially on *Paradox*, where it placed fifth—outpacing any number of 25s and 40s. While this is a light, compact box, Austin doesn't cramp your style when it comes to adding boards and drives. The WinStation has six slots and five bays to spare. And you can upgrade with Intel's 20/40-MHz clock doubler.

Austin's service and support policies are fine, with 24-hour toll-free tech support, a year of free on-site service, and a guaranteed 24-hour turnaround on repairs. And while a few of the answers we got from tech support fell short of 100 percent accuracy, our calls were answered quickly and courteously. In fact, there's only one serious drawback to the WinStation: its fairly steep $2842 price. That aside, it's a solid value.

One of the fastest 20-MHz units, the nicely compact Austin WinStation did especially well on our Paradox tests.

A price/performance winner, the BLK 386/40 sports a zippy hard disk that blasted through our dBASE test.

Blackship BLK 386/40

PROS: Fast, inexpensive, upgradable, very good support, lots of slots and bays
CONS: Poor documentation

Thanks to low price and high performance, Blackship systems have generally rated well in *PC World*. Now and then one has even risen up like David to smite an overpriced, big-name Goliath. This system rated best overall of the 386/40s in this roundup, and the BLK 386/40 is quite fast—especially on *dBASE*. Moreover, its $2233 price is one of the lowest and the CPU is mounted on a board—you can swap for a 33-MHz 486DX CPU card for only $795. There's plenty of head and shoulder room, with a half-dozen free slots and five drive bays.

Reliable service and support is no problem: You get a year of free on-site service and patient toll-free tech support—fortunate since the documentation is thin. Given its fast performance, reasonable cost, and easy upgradability, we don't hesitate to recommend the BLK 386/40—the fast hard disk and roomy interior make it a good choice as a server.

Blackship BLK 486SX/20

PROS: Expandable, board upgradable, very good support
CONS: Poor documentation, no clock doubler support

Although Blackship's BLK 486SX/20 costs about $150 more than its virtually identical 386/40 sibling (which uses the same Motherboard Factory motherboard), it's actually a bit slower. Yet at a perfectly reasonable $2389 it is not without its charms. One of them is its ability to swap up to a 33-MHz 486DX module for only $795. (It might cost less, since you can trade your old board for half its current value.) The upgrade board doesn't yet support Intel's clock doublers, but few will need better than 33-MHz 486DX performance in the near future anyway.

Naturally, you get the same fine service and support (and the same poor documentation) as you do with the BLK 386/40. The toll-free tech support number is even pasted onto the rear of the case! True, Blackship's 386/40 is faster and cheaper—and since it uses the same motherboard, it's just as upgradable. But this 486/20 is still a good buy.

Swap it out, swap it in: A $795 CPU board upgrade turns your Blackship 20-MHz 486SX into a 33-MHz 486DX.

Inside the 386/40 *by Karl Koessel*

American Micro Devices' 40-MHz 80386 is a close clone of Intel's 386—but its package is smaller, and it runs at 40 MHz instead of 33. Does this processor fit your future? For an answer, pair the CPUs with their systems.

Current 386/40 systems are slightly cheaper on average than 20-MHz 486SXs, but they're more expensive to make; prices are bound to flip-flop. Unlike the 486SX, with its on-board 8K memory cache, the 386/40 requires a large, expensive external cache to match up. The 486SX also executes each of the most common instructions in one clock cycle, while the 386 requires several, enabling the 486SX to get more work done per second than a 386 running at the same clock speed.

And while the 486SX uses a system clock matched to its CPU speed, the 386 requires a more expensive system clock that runs at twice its CPU speed—along with costly shielding necessary to keep high-frequency emissions from interfering with radio and TV reception.

Other than great performance, the good news about the AMD 386/40s is their Intel compatibility. Our test lab ran the latest 386/40 systems through a tough compatibility gauntlet, and the new CPU didn't skip a beat.

You want quality—you pay for it. But even for a fast, well-designed EISA PC like this Compaq, $4696 is a load.

Compaq Deskpro 486s/25M

PROS: Fast, expandable, EISA bus

CONS: Very expensive

Looking for a server? Compaq's 25-MHz Deskpro 486s/25M is a heavy hitter and big league contender. Like most stars it doesn't play for a rookie's salary; at $4696, the 486s/25M is the most expensive PC in our roundup. Still, this system delivers hot performance, placing fifth overall. And if you think a 32-bit network card will help your server hit the ground running, the Compaq's EISA bus is ready. You get a respectable slot and bay count and a case that opens with a twirl of the thumbscrews. You can upgrade by installing an inexpensive 25/50-MHz clock doubler or move up to a 486DX/33 with Compaq's $1499 processor card.

Compaq provides toll-free tech support, but for additional service go to your dealer. The Deskpro 486s/25M is a class act, but consider whether all of Compaq's R&D on reliability is worth the price—especially when you can buy two Best Buy Eltechs, and still have $750 left.

CompuTrend 386/40C

PROS: Lowest price in the roundup, very good performance and service

CONS: No upgrade path, low slot count, awkward design

At a dreamlike $1870, CompuTrend's 386/40C boasts the lowest price in our roundup and has a fast 3½-star performance in the bargain. When you turn on the system you'll find both DOS 5.0 and *Windows* preinstalled. You get a lofty 64MB of fast RAM with CompuTrend's RAM card, or 32MB with standard SIMMs installed on the motherboard. The four drive bays should be adequate for any workstation—although you may feel a bit limited by only four free slots. The case is large and heavy, and replacing components is awkward. A more serious issue: CompuTrend paves no path to a more powerful CPU.

Support is quite good. There's unlimited toll-free phone help, and on-site service is available for less than $100 per year. If you can live with a few design flaws and without an upgrade path, the CompuTrend 386/40C's dazzling price makes it a very good value.

It's big and heavy, and it's not upgradable, but CompuTrend's fast 386/40C comes with a seductive $1870 price tag.

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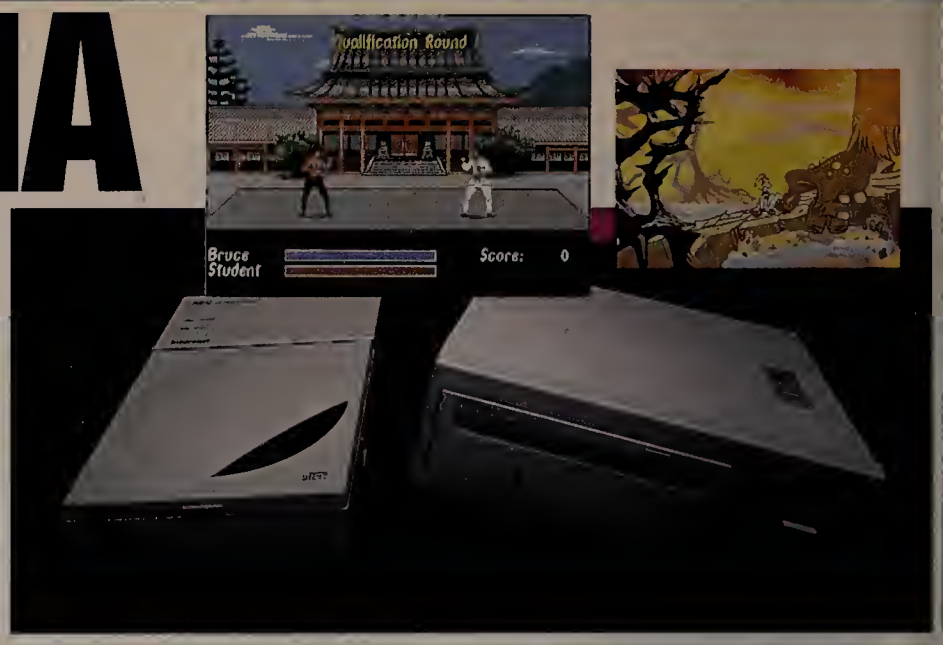

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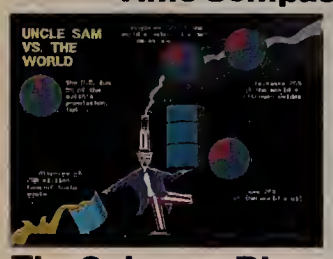

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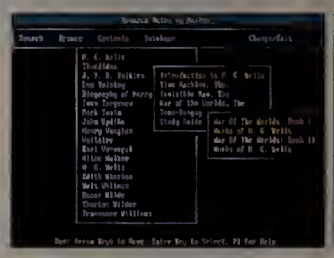

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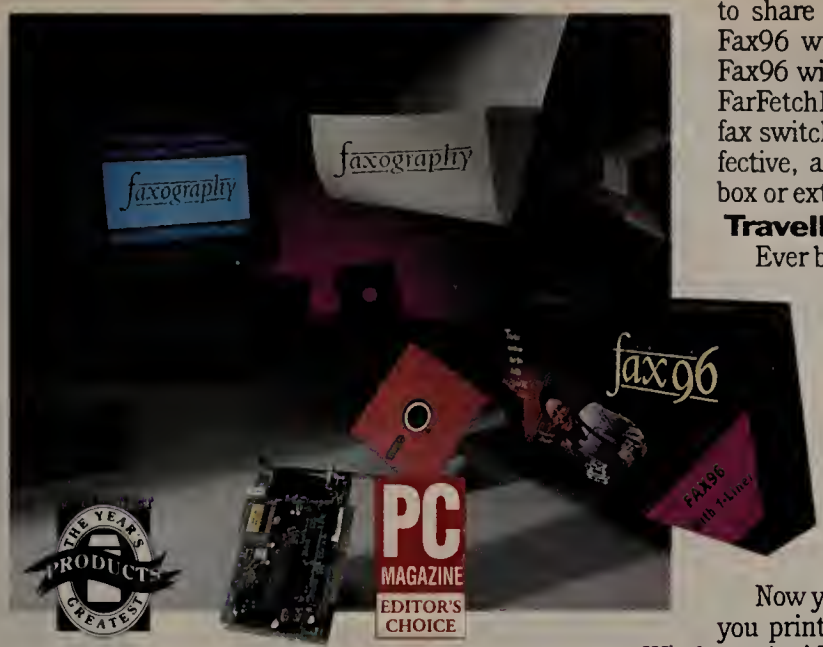

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Fax96 New Low Prices

BAY6240 Fax96	$99.95
BAY6250 Fax96 with 1-Liner	$149.95
BAY6270 Fax96 with Modem	$129.95
BAY6280 Fax96 with Modem/Windows	$149.95
BAY6255 1-Liner Fax/Modem	$189.95
BAY6256 1-Liner Fax/Modem/Windows	$199.95

Requires IBM PC/XT/AT or compatible, 640K memory and hard disk, available half-slot. Fax Window requires Fax96 with Modem.

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Cleaner and Simpler Windows...

Question: What's the easiest, most intuitive way to run a PC?

The jump from your PC's C:> to Windows was a major advance for ease-of-use. But there was still room for improvement. Norton Desktop took another step forward, but didn't go far enough. Finally, WinTools has arrived, delivering new "Drag and Drop" technology and the kind of power that is best summed up in two words: *Simply and Visually.*

WinTools is the first, complete, visual interface that lets you easily customize your computer screen and automate your work, plus many more features.

Do All This with WinTools...

- WinTools remembers how you set up your desktop. So the next time you turn on your computer, you don't waste time recreating your environment.
- Manage files with "Drag and Drop" technology. Copy, move and delete files and subdirectories in the simplest way known — visually. Select multiple groups of tools to drag and drop or open and run as one tool. Tools work with other tools. For example, you might have one tool icon representing a word processor and another that represents a file. All you have to do is drag the icon of the file onto the icon of the word processor and your application is launched and the file opens.

- Choose from 100 included icons or create your own meaningful image.
- Set up one icon to run multiple applications with a click of the mouse. Automatically open all the files and applications you assign to a single icon.
- Control security on a network. Password protection can be set at any level, so users can have full access to their local hard drives, but not the server. Or, a company-wide interface can easily be built.
- Automatic backups are included in the way WinTools runs. But you can also schedule and automate other functions as well.
- Introducing "BigSky," the virtual screen technology that lets you have 16 full screens, each customized for a specific type of work. Set up one as a "phone calls desk." Set up another as a "writing desk." Have one as an "interview desk," and still another as a "drawing desk." All set up just the way you like to work, each independent and uncluttered, and each in their own screen. Then, instantly switch between them with a click of the mouse. How convenient! And, when you turn off your computer, everything is remembered.
- Manage files by searching by name, date of creation, size or attributes on one or more disk drives; undelete files; and set up filters for file types — all accomplished visually. Or, drag a file to the desktop and it will be a fully functional tool icon with all of the drag and drop capabilities of other tools.
- DDE and Keystroke messages can be sent to other applications by passing parameters or creating batch files.
- On-line Help is available by dragging a tool onto Help for specific information or by double-clicking Help to access information about all of WinTools. You can also create your own tool-specific help.
- On-Line Tutorials are available to step you through almost every feature of WinTools.

Simply and Visually — that's the keynote for WinTools' powerful new Windows' interface.

Solve Windows Problems.

Organize your daily activities to correspond to your boss's schedule. Set up one desktop for meetings, another for budgets and so on. With WinTool's BigSky, you can have up to 16 full screen desktops. By double-clicking anywhere on the screen, Big Sky appears and lets you see the status of all 16 desktops and select which one is active.

WinTools meets the need of a first-time user with its visual access to a PC's power, while providing unmatched customization and automation facilities for experienced users.

Includes *free* Image Librarian (a $49.00 value) and BigSky (a $49.00 value).

WINTOOLS

BAY4210 WinTools	$149.00

Requires Microsoft Windows 3.0.

International Orders: 305-443-8212 24-Hour Fax Line: 305-444-5010 **FREE FEDERAL EXPRESS SHIPPING**

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CUI Advantage 386-40CX

PROS: Fast, good design, plenty of slots and bays

CONS: No technical support, no upgrade path

The reasonably priced CUI Advantage 386-40CX offers excellent expansion capacity with five drive bays and six free slots, the interior is uncluttered, and a diagnostic LED indicator on the front panel offers further evidence of well-considered design. There's one flaw in this picture: You can't upgrade the CPU. CUI sells direct and through dealers. Although the Advantage's $2405 street price seems reasonable enough, in this case you could save about $400 by buying direct.

Unfortunately, there's no central tech support and no support guarantee from dealers, either. On the bright side you can buy a one-year on-site service contract for under $200, and the 48-hour turnaround policy means you shouldn't suffer too long if your system needs repair. The CUI gets good marks for performance, price, and design, but you'd better shop for a dealer who will provide good tech support .

What's going on inside? Just check the Advantage 386-40CX's front-mounted LED diagnostics.

The fast Dell can go faster with your choice of upgrades—but the price will make a tight fit for slim budgets.

Dell System 486D/25

PROS: Top performance, flexible upgrade, fine support

CONS: Expensive

Dell is known for well-designed, inexpensive computers. Its PCs are better than ever, but "inexpensive" is a moving target: At $3249, Dell's System 486D/25 is the fifth-priciest machine in our roundup. But it's also fourth fastest, thanks to its powerful 25-MHz 486SX processor, and it boasts one of the most intelligent upgrade schemes around. Moving a jumper changes the system clock speed, so instead of buying an expensive CPU board, you can pop in a new $700 486DX/33 CPU or an even cheaper clock doubler. You also get five drive bays, six free slots, and a front-panel LED diagnostic indicator.

The top-notch support includes a year of free on-site service *and* a 24-hour repair turnaround policy. Even though the Dell's high price keeps it out of the winner's circle, if you have the cash on hand, the System 486D/25 would be a smart way to spend it.

DTK KEEN-4000

PROS: Fast, inexpensive, generous complement of slots and bays

CONS: No Class B rating for home use, no upgrade path, RAM card blocks slot

The DTK KEEN-4000 combines the fourth-lowest price in the roundup with solid speed, and it's exceptionally quick in *Windows*. This full-sized tower offers six free slots and five bays. The 16MB fast-RAM ceiling is lowest in the roundup, but few will bump their heads against it unless they use this 386/40 as a server. To fill out the last 8MB of RAM, however, you'll first need to buy a $99 RAM card, which blocks one of two 8-bit slots. More bad news: There's no CPU upgrade path, and it's against the law to use the KEEN-4000 at home, as the system lacks an FCC Class B rating, so it may interfere with TVs and radios.

Service and support is mixed: DTK provides central tech support, but you pay the toll, and there's no on-site service. Still, if you can live with a nonupgradable system and never stray from the office, the KEEN-4000 makes a tempting value as a low-cost *Windows* workstation.

Kids, don't try this at home—the DTK KEEN-4000 lacks the Class B radio frequency protection required for home use.

Eltech Model 3400

PROS: Fast, inexpensive, plenty of slots ond bays

CONS: Nonupgradable CPU, one-week-repoir turnaround policy

The Eltech Model 3400 is a solid 386/40 performer, and at $2219, it features the fifth-lowest price in the roundup. It resembles its powerhouse sibling, Eltech's Model 4200 486SX/25, which earns a Best Buy in this review, but it's a bit slower and a tad more expensive, and it lacks a CPU upgrade path. Still, it beats the 4200 at *dBASE, Paradox,* and *Windows,* thanks in part to an external 64K memory cache that's upgradable to 256K. The compact case manages to house six free slots and five drive bays, and Eltech preloads DOS and *Windows* on the hard disk.

Technical support is rock solid, and if you want to extend the standard six months of on-site service to a year, you can do so for a mere $69. In fact, aside from the lack of an upgrade path, this makes one great *Windows* workstation. But most buyers will pass it by and save about $250 with the faster, upgradable Eltech 4200 486SX/25.

If CPU upgradability isn't important, you'll love this fast, nicely designed Windows machine.

Intel's Instant Upgrade Plan

Intel has just smoothed the upgrade path by announcing a family of 486 "clock doubler" chips scheduled to hit market this spring. These inexpensive ($300 to $350) CPUs slip into the processor upgrade socket built into most 486SX motherboards. Plug a 486SX doubler into, say, a 20-MHz 486SX, and the original CPU goes to sleep, while the doubler executes instructions twice as fast.

Intel will offer both 486SX and 486DX clack daublers; all of them include an-chip math coprocessors. You'll be able to buy clock doublers for any 486SX clock speed, and Intel claims that an increasing number of 486DX systems are being designed to accept the upgrade chips. So if your 33-MHz 486DX is too slow, pop out the old, plug in the new, and enjoy 66-MHz performance. Well—almost—and only for processor-intensive applications like recalculating a huge spreadsheet. Depending on the applicatian, the real-world increase in speed will probably be about 50 percent—still nothing to sneeze at.

Naturally, a 486 chip doubler wan't fit in a 386 socket. But that doesn't mean you're out af luck, provided you buy a 386 with a replaceable processor baard.

Processor board upgrades, available for several systems in this review, often hold both CPU and system memory. The advantages? A replacement board with a more powerful type of CPU as well as a higher clock speed, enabling a move from, say, a 25-MHz 386 ta a 33-MHz 486. And you get better perfarmance from a CPU board upgrade, mainly because memary access accelerates along with internal pracessing.

A pracessor board upgrade is cheaper than a new matherboard but more costly than a chip swap. But with a board upgrade, the sky's the limit. Some vendors in this review affer the most flexible arrangement: CPU boards with upgrade sockets, so you can swap chips, baards, or both. For example, you cauld pap in a board to boost your 20-MHz SX to a 33-MHz DX and then plug in a doubler chip to boost CPU speed ta 66 MHz.

Another option is a chip-up scheme, such as the one on the ALR 486SX/20 BusinessStation in this roundup. This inexpensive and easy technique involves pulling out the old SX CPU and snapping in a faster DX. But the system must be designed to support such a swap, and even sa, memory and support chips may not match perfectly. Dell offers a slick variation on the chip-up technique: A special socket accepts both 486SX and 486DX chips, and a jumper lets yau dial up different system clock speeds, from 20 MHz all the way to 33. You can chip up from a 20-MHz 486SX to a full-powered 33-MHz 486DX with a flawless match between CPU and motherbaard.

With these and other upgrade schemes, never make assumptions. For example, just because your SX lacks a pracessor upgrade socket, don't assume it wan't take a clack doubler. The vast majarity da, althaugh you have ta extract the ald CPU withaut damaging the matherboard. An increasing number of upgrade schemes are emerging, so if yau're interested in a system not reviewed here, cantact the manufacturer ta determine exactly haw much headraam you can expect.

Eltech Model 4200

PROS: Fast, very low price, lots of slots and bays, clock doubler upgrade

CONS: One-week-repair turnaround policy

Can we interest you in a fast, ultra-affordable 486SX/25 that's so well designed we have to scrounge for nits to pick? Meet our Best Buy, the Eltech Model 4200. At $1964, this PC boasts the second-lowest price in the roundup *and* four-star performance. Spreadsheet mavens will be particularly interested, since this system placed fifth in our *1-2-3* test (it did not do as well on the data base tests, so if that's your key application, spend an extra $300 for Eltech's caching controller). The compact case fits in six free slots and five drive bays, and the ports are even labeled.

Technical support is very good, and this is Eltech's third Best Buy since October. The bottom line? Eltech's Model 4200 is fast, inexpensive, and expandable—and when Intel releases its clock doublers you'll be on the upgrade path to 50 MHz. That sounds like a Best Buy to us!

Eltech makes a "three-peat" with its third PC World Best Buy in the last six months. This scorcher covers all the bases.

Howlingly fast speed derives from a somewhat suspect "pushed" chip, but a nonpushed unit is on its way.

FastMicro FastData 486SX/25

PROS: Very fast, clock doubler upgrade, lots of slots and bays

CONS: "Pushed" CPU

FastData's 486SX/25 is a screamer that scored second on overall performance—but there's a catch. The test unit FastMicro sent us used a 20-MHz chip "pushed" to 25 MHz by the Mitac motherboard. Pushed chips harbor a danger of premature failure. At press time, the company assured us it was shipping only units with 25-MHz processors, but we recommend you take advantage of FastMicro's 30-day money-back guarantee and check the rating printed on the CPU chip.

Otherwise this seems a solid machine. You get six free slots and five front-accessible drive bays, and the $2549 price covers a 200MB hard disk. FastMicro's support is very good. But before the company decides whether to give you on-site service or system replacement, FastMicro ships parts and asks you to fix it yourself. This system is tempting, but we'll reserve judgment until we can test the real 25-MHz McCoy.

Hewlett-Packard Vectra 486s/20

PROS: Fast, EISA bus, clock doubler upgrade, superb service and support

CONS: Very expensive

The Vectra 486s/20 is anything but a cheap ride: $4522 is the second-highest price here. But the Vectra gives you a lot for the money. It's a fast performer for a 20-MHz machine, and if you want faster throughput you can install a 20/40-MHz clock doubler. Its EISA bus makes it a capable LAN server. Thoughtful design goes to the tiniest details—the heavy-duty plastic case is lined with steel, and nifty finger latches make for an easy-open hood. Components are packed tight, but the hinged full-height bay and power supply provide easy motherboard access, and clear diagrams show exactly how to swing them out.

HP's service and support is splendid: Waits on the toll-free line were short, we found technicians long on courtesy and accuracy, and you get on-site service. The Vectra sports a luxury price, but if service is a high priority, and you like the idea of an EISA bus, it is worth a look.

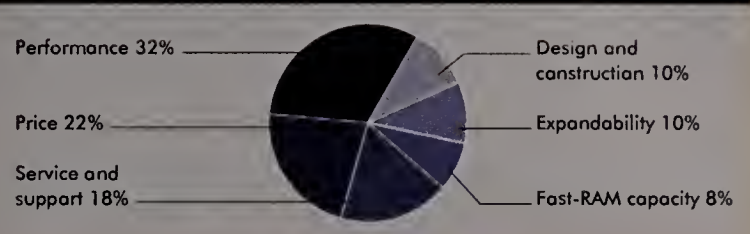
Superb design details, solid performance, and excellent support are all yours—if you're willing to pony up $4522.

Eltech's 25-MHz 486SX: Startling Power, Shocking Price

Overall, 40-MHz 386s offer better price/performance than 486SXs, but Eltech bucks the trend.

If you need a fast, powerful PC right now, buying a system based on AMD's 386/40 chip makes sense. But if you want to take advantage of Intel's low-cost clock-doubler upgrade, the 486SX is your only choice. The 25-MHz 486SX **Eltech Model 4200** wins a Best Buy, delivering not only fast performance but also sound construction, high fast-RAM capacity, an upgradable CPU, and an unbelievably low price.

Key Buying Issues: Percentage of Importance



Excellent ★★★★
Good ★★★
Fair ★★
Poor ★

	Reader service number	Performance	Price	Service and support	Design and construction	Expandability	Fast-RAM capacity	Overall value
ALR BusinessStation 486ASX	780	☆☆☆	½	☆☆☆½	☆☆☆☆	☆☆☆½	☆☆☆☆	★★★
Arche Master 386/40	781	☆☆☆☆	☆½	☆☆☆½	☆☆☆	☆☆☆½	☆☆☆☆	★★★
ATronics ATI 486SX/20	782	☆☆½	☆☆☆☆	☆☆☆½	☆☆☆½	☆☆☆½	☆☆☆☆	★★★½
Austin WinStation 486SX/20	783	☆☆☆½	☆☆	☆☆☆½	☆☆☆½	☆☆☆	☆☆☆☆	★★★
Blackship BLK 386/40	784	☆☆☆½	☆☆☆½	☆☆☆½	☆☆☆	☆☆☆☆	☆☆☆☆	★★★½
Blackship BLK 486SX/20	784	☆☆☆	☆☆☆	☆☆☆½	☆☆☆	☆☆☆½	☆☆☆☆	★★★
Compaq Deskpro 486s/25M	785	☆☆☆☆	½	☆☆☆	☆☆☆☆	☆☆☆½	☆☆☆☆	★★★
CompuTrend 386/40C	786	☆☆☆½	☆☆☆☆	☆☆☆½	☆☆☆	☆☆½	☆☆☆☆	★★★½
CUI Advantage 386-40CX	787	☆☆☆½	☆☆☆	☆	☆☆☆½	☆☆☆	☆☆☆☆	★★★
Dell System 486D/25	788	☆☆☆☆	½	☆☆☆½	☆☆☆½	☆☆☆☆	☆☆☆☆	★★★
DTK KEEN-4000	789	☆☆☆½	☆☆☆½	☆☆☆	☆☆☆	☆☆½	☆☆☆☆	★★★½
Eltech Model 3400	790	☆☆☆½	☆☆☆½	☆☆☆½	☆☆☆½	☆☆☆	☆☆☆☆	★★★½
Eltech Model 4200	790	★★★★	★★★★	★★★½	★★★½	★★★½	★★★★	★★★★
FastMicro FastData 486SX/25	791	☆☆☆☆	☆½	☆☆☆½	☆☆☆	☆☆☆½	☆☆☆☆	★★★
HP Vectra 486s/20	792	☆☆☆½	½	☆☆☆½	☆☆☆½	☆☆☆	☆☆☆☆	★★★
Hyundai CS-386/40	793	☆☆☆½	☆½	☆½	☆☆☆½	☆☆☆☆	☆☆☆☆	★★★
Hyundai CS-486SX/20	793	☆☆☆	☆	☆½	☆☆☆½	☆☆☆½	☆☆☆☆	★★½
Micro Express ME 386-40	794	☆☆☆☆	☆☆½	☆☆☆½	☆☆☆½	☆☆☆	☆☆☆☆	★★★½
Northgate 386/40	795	☆☆☆½	☆☆½	☆☆☆½	☆☆☆½	☆☆☆	☆☆☆☆	★★★½
Swan 486SX/25	796	☆☆☆☆	☆☆	☆☆☆☆	☆☆☆	☆☆☆	☆☆☆☆	★★★½
Tangent Model 340	797	☆☆☆☆	☆☆☆	☆☆☆½	☆☆☆	☆☆½	☆☆☆☆	★★★½
Touche 5550T 486SX 20	798	☆☆☆½	½	☆☆☆	☆☆☆½	☆☆☆	☆☆☆☆	★★½
Twinhead Superset 600/420C	799	☆☆☆	☆	☆☆☆½	☆☆☆½	☆☆☆½	☆☆☆☆	★★★
ZDS Z-486SX/20E	800	☆☆☆	½	☆☆☆½	☆☆☆☆	☆☆½	☆☆☆☆	★★½
Zeos 486SX-20	801	☆½	☆☆	☆☆☆½	☆☆☆½	☆☆☆☆	☆☆☆☆	★★½

Overall value is calculated by multiplying each category rating by the category's weight percentage, summing the results, and rounding to the nearest half number.

FEATURES EVALUATION

The Upwardly Mobile CPU

Only the 486SX systems in this roundup accept Intel's clock doubler, the chip that doubles a system's original processing speed. But almost half the PCs here, including three 386/40s, let you to move up to any higher speed CPU.

● Yes
○ No
n/a = not applicable

	ALR BusinessStation 486ASX	Arche Master 386/40	ATronics ATI 486SX/20	Austin WinStation 486SX/20	Blackship BLK 386/40	Blackship BLK 486SX/20	Compaq Deskpro 486s/25M	CompuTrend 386/40C	CUI Advantage 386-40 CX	Dell System 486D/25
Standard features										
Street price[1]	$3557[2]	$2994	$1995	$2842	$2233	$2389	$4696	$1870	$2405	$3249
List price[1]	$4444[2]	$4898	$2145	$2842	$2320	$2420	$5397	$1870	$1995	$3249
External memory cache (K)	0	128	64	0	64	64	16	64	64	0
Bus	EISA	ISA	ISA	ISA	ISA	ISA	EISA	ISA	ISA	ISA
Direct/discount/dealer sales[4]	○/●/●	○/○/●	●/○/●	●/○/○	●/○/○	●/○/○	○/●/●	●/○/●	●[5]/○/●	●/●/●
Windows included	○	●	○	●	●	●	○	●	●	○
Hard disk	IDE	IDE	IDE	IDE	IDE	IDE	IDE	IDE	IDE	IDE
Design and construction										
Switchless setup	●	○	○	○	○	○	●	○	○	○
Setup utility in ROM	●	●	●	●	●	●	●	●	●	●
Compact faatprint	●	○	●	●	○	○	○	○	●	●
Tilt-and-swivel monitor	●	●	●	●	●	●	●	●	●	●
Front-panel on/off switch	●	○	●	○	●	●	●	○	●	●
Parallel/serial/mouse ports	1/2/1	1/2/0	1/2/0	1/2/0	1/2/0	1/2/0	1/2/1	1/2/0	1/2/0	1/2/1
Expandability										
Free 32-/16-/8-bit slats	2/1[6]/0	0/3/1	0/5/2	0/5/1	0/6/0	0/6/0	4/0/0	0/3/1	0/6/0	0/6/0
Externally accessible/internal drive bays[7]	3/0	3/0	3/2	3/2	3/2	3/2	4/0	3/1	3/2	3/2
Largest hard disk option	340MB	650MB	200MB	1.6GB	1.4GB	1.4GB	510MB	600MB	1.2GB	1.2GB
Baard or chip upgrade	●	●	●	○	●	●	●	○	○	●
Supports clack-doubler chip	●	○	●	●	○	○	●	○	○	●
Fast-RAM capacity	33MB	32MB	64MB	32MB	64MB	64MB	64MB	64MB	32MB	64MB
Service and support										
Warranty (months)	12	24	12	12	12	12	12	12	12	12
On-site service/under $100 per year	●/●	●/●[10,11]	●/●	●/●[11]	●/●[11]	●/●[11]	○/○	●/●	●/○	●/●[11]
Turnaround policy	○	72 haurs	72 haurs	24 haurs	48 haurs	48 haurs	○	72 haurs	48 haurs	24 haurs
Free unlimited support	●	●	●	●	●	●	●	●	●	●
Vendor suppart										
Central support/toll-free	●/○	●/●	●/●[14]	●/●	●/●	●/●	●/●	●/●	○/○	●/●
Daily support (hours)	11	9	9	24	10	10	12	8.5	n/a	15
Weekend support	○	○	○	●	○	○	○	○	n/a	●
Electronic BBS/fax	●/●	○/●	○/●	●/●	○/●	○/●	○/○	○/●	○/●	●/●
Vendor-to-dealer support										
Dedicated suppart staff required	○	○	○	na dealers	na dealers	na dealers	○	○	○	na dealers
Support staff training required	○	○	○	na dealers	na dealers	na dealers	○	○	○	na dealers
Dedicated support line for dealers	●	●	○	na dealers	na dealers	na dealers	●	●	○	na dealers
Inventory and parts requirement	○	●	○	na dealers	na dealers	na dealers	●	○	○	na dealers

[1] Standard configuratian includes 4MB RAM, 90MB ta 125MB hard drive, 1.2MB or 1.44MB floppy drive, VGA and color monitor, at least ane parallel and two serial (or one serial and one mouse) ports, keyboard, mouse, and DOS. We include a fair estimated cost for components not provided.
[2] Includes 5MB RAM and 200MB hard disk.
[3] Includes 200MB hard disk and CD ROM drive.
[4] "Dealer" includes value-added resellers.
[5] Government and corporate only.

DTK KEEN-4000	Eltech Model 3400	Eltech Model 4200	FastMicro FastData 486SX/25	HP Vectra 486s/20	Hyundai CS-386/40	Hyundai CS-486SX/20	Micro Express ME 386-40	Northgate 386/40	Swan 486SX/25	Tangent Model 340	Touche 5550T 486SX 20	Twinhead Superset 600/420C	ZDS Z-486SX/20E	Zeos 486SX-20
$2180	$2219	$1964	$2549	$4522	$2924	$3140	$2550	$2599	$2795	$2383	$2797[3]	$3049	$4009	$2695
$2395	$2219	$1964	$2549	$5883	$3795	$3965	$2599	$2599	$3395	$2515	$2797[3]	$3899	$5799	$2845
64	64	0	64	0	64	64	64	64	64	64	64	64	0	0
ISA	ISA	ISA	ISA	EISA	ISA	ISA	ISA	ISA	ISA	ISA	ISA	ISA	EISA	ISA
○/○/●	●/○/●	●/●/●	●/○/○	○/○/●	○/●/●	○/●/●	●/○/○	●/○/●	●/○/○	●/○/●	●/○/○	○/○/●	●[5]/○/●	●/○/○
○	●	●	●	○	●	●	○	●	●	●	●	●	●	●
IDE	IDE	IDE	IDE	IDE	IDE	IDE	IDE	IDE	IDE	IDE	IDE	IDE	IDE	IDE
○	○	●	○	●	○	○	○	○	○	○	○	○	●	○
●	●	●	●	○	●	●	●	●	●	●	●	●	●	●
○	●	●	○	○	●	●	●	●	○	○	○	●	●	○
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
●	○	●	●	●	●	●	●	○	○	○	●	●	●	●
1/2/0	1/2/0	1/2/0	1/2/0	1/2/1	1/2/1	1/2/1	1/2/0	1/2/0	1/2/0	1/2/0	1/2/0	1/2/0	1/2/0	1/2/0
0/4/2	0/6/0	0/6/0	0/5/1	4/0/0	0/6/0	0/6/0	0/5/1	0/4/2	0/3/2	0/5/0	0/4/0	0/4/0	3/0/0	0/6/1
3/2	5/0	5/0	5/0	3/1	3/2	3/2	4/1	5/0	3/1	3/1	4/4	3/1	3/0	4/4
n/o[8]	400MB	400MB	1GB	430MB	500MB	500MB	1.2GB	1.2GB	660MB	1.2GB	1.2GB	200MB	200MB	1.2GB
○	○	●	○	○	●	●	○	○	○	○	○	●	○	●
○	○	●	●	●	○	○	○	○	●	○	●	●	●	●
16MB	32MB	32MB	32MB	64MB	64MB	64MB	32MB	32MB	32MB	32MB	32MB	32MB	32MB	32MB
12	12	12	12	12	18	18	24	12[9]	24	12	24	12	12	12[9]
○/○	●/●[12]	●/●[12]	●/●[13]	●/●	●/●	●/●	●/●	●/●[11]	●/●[10,11]	●/●[11]	●/●	●/●[11]	●/●	●/●
1 week	1 week	1 week	○	72 hours	○	○	48 hours	○	72 hours	24 hours	24 hours	48 hours	48 hours	○
●	○	●	●	●	○	○	●	●	●	●	●	●	●	●
●/○	●/●	●/●	●	●/●	○/○	○/○	●/●	●/●	●/●	●/●	●/●	●/●	○/○	●/●
8.5	9	9	9	14	n/o	n/o	9	24	12	10	8	11	n/a	24
○	○	●	●	○	n/o	n/a	○	●	●	○	○	○	n/a	●
●/●	○/●	●/●	○/●	●/●	○/○	○/○	○/●	●/●	●/●	●/●	●/●	●/●	●/○	●/●
○	○	●	no dealers	○	○	○	no dealers	no dealers	no dealers	no dealers	no dealers	○	●	no dealers
○	○	●	no dealers	○	○	○	no dealers	no dealers	no dealers	no dealers	no dealers	○	●	no dealers
○	○	●	no dealers	○	●	●	no dealers	no dealers	no dealers	no dealers	no dealers	○	●	no dealers
○	●	●	no dealers	○	○	○	no dealers	no dealers	no dealers	no dealers	no dealers	○	●	no dealers
		BEST BUY												

[6] Proprietary slot takes only ALR peripherals.
[7] Half or third height.
[8] Dealer installs hard disk, VGA, and other components.
[9] 60 months on keyboard.
[10] 24 months.
[11] Free.
[12] Six months free, full year $69.
[13] Free, but vendor ships replacement parts first in attempt to remedy problem.
[14] Not in California.

Hyundai CS-386/40

PROS: Fast, plenty of slots and bays, upgradable CPU

CONS: Expensive, poor service

Hyundai's CS-386/40 is designed around a backplane motherboard, with a separate CPU board. It's an easy upgrade to a 33-MHz 486DX via board swap, and the Motherboard Factory motherboard (also part of Hyundai's CS-486SX/20 and both Blackships in this review) lets you mix 256K, 1MB, and 4MB RAM chips up to its 64MB limit. But the Hyundai's price is high—at $2924, the CS-386/40 costs almost $700 more than the faster Blackship BLK 386/40. The upgrade module is also pricey: Hyundai charges $1695 while Blackship lets you off for only $795.

The compact case is a breeze to open, and there's ample room for boards and drives. Documentation is tops, but support is weak. Hyundai offers an 18-month warranty and a year's on-site service, but no central tech support and little vendor-to-dealer support. The CS-386/40 is a creditable buy, but you'll like the Blackship BLK 386/40 better.

If Hyundai lowered the price and improved support, it would have a star on its hands with the CS-386/40.

If you want to buy from Hyundai, you're better off with the 386/40. Hyundai's 486SX/20 is slower and pricier.

Hyundai CS-486SX/20

PROS: Processor board upgrade, plenty of slots and bays

CONS: Expensive, no clock doubler upgrade, poor service

Hyundai's CS-486SX/20 features the same motherboard as the Blackships and the Hyundai 386/40 reviewed here. The Hyundais are twins—we had to stick labels on the two machines in order to tell them apart. Just about everything (except the processor) is the same, including six free slots, five bays, the capability to mix different SIMMs, and lack of support for Intel's clock doublers. At $3140, the CS-486SX/20 is relatively expensive; you pay more for this 20-MHz version than you do for the swifter 386/40. With the modular CPU, it's easy to swap to 33-MHz 486DX—but at $1695, the upgrade isn't cheap.

The case is unusually easy to open—there's only one screw to remove, and then you press two tabs to pop the lid. Documentation is solid too, but support leaves a lot to be desired. This 486SX/20 is slower and more expensive than its own 386/40 stablemate; you can do better elsewhere.

Micro Express ME 386-40

PROS: Very fast, plenty of slots and bays, good service and support

CONS: Fairly expensive, no upgrade path

You may not find a hotter 386 than the $2550 Micro Express ME 386-40: It blazed into third place overall and was first on *dBASE*. The ME 386-40 puts six free expansion slots and five drive bays into a compact case, and includes an unusual keyboard with built-in trackball. The case is a snap to open, but the CPU isn't upgradable, and you have to lift out the hard disk to install a coprocessor. At $2550 the ME is more expensive than most 386/40s, but it's cheapest of the top five performers.

Micro Express offers toll-free tech support and a two-year parts-and-labor warranty. If serious problems crop up in the first four months, Micro Express pays the two-way freight; there's a 48-hour repair turnaround, and you can pump up the protection with a year of on-site service for less than $100. The ME 386-40 has a lot going for it, especially if you're a data base hound hunting an affordable speed demon.

Want top speed today, and tomorrow be damned? You can't do much better than the well-supported ME 386-40.

Get a hold of the best value in LAN power protection for just $169 suggested list price

Blackouts, brownouts, sags... Your data and hardware are vulnerable to problems that surge suppressors and power directors are just not equipped to handle.

Now there's a complete Uninterruptible Power Supply solution to suit any budget. The Back-UPS™ 250 is reliable protection for LAN nodes, 386SX machines, 286, small PS/2 systems, and internetworking hardware such as routers, bridges, gateways and hubs.

From the largest server to the smallest router, the Back-UPS Series will increase your productivity by providing a cost-effective solution to power problems. Call for your free power protection handbook.

The **NEW Back-UPS 250** offers even more cost-effective protection for LAN nodes (typical runtime for a 386SX system is 10 minutes).

Computer ResellerNews Editors' Choice

- Full-time surge protection and line filtering
- Models from 250 to 1200 Volt-Amps, many with LAN interface for automatic-shutdown of Novell, LAN Manager, LAN Server, LANtastic, Banyan, SCO Unix, SunOS, AIX etc.
- UL, CSA and Novell approved with a 2 year warranty
- 230V models available
- Ask about PowerChute® UPS monitoring software and Novell-compatible UPS monitoring boards

LAN TIMES READERS CHOICE 1990 · LAN TIMES READERS CHOICE 1991

	Model	Application	List
NEW!	Back-UPS 250	386SX, 286, XT, AT, internet hardware, POS	$169
NEW!	Back-UPS 400	Desktop 386, 486 systems, 286 servers	$249
NEW!	Back-UPS 450	Tower 386, 486 systems, servers	$329
NEW!	Back-UPS 600	Heavily configured systems, CAD/CAM workstations	$449
	Back-UPS 800RT	Multiple systems, longer runtime applications	$899
	Back-UPS 1200VX	Multiple systems, LAN hubs, small minis, telecom equipment	$1199

The Back-UPS™

by American Power Conversion

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14,400 bps DATA
14,400 bps FAX
Voice*
Caller ID*
5 Year Warranty
$399.95

Are We Connecting Yet?

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9600 bps Version
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Circle 267 on reader service card

Best of the Rest: New 386/40 and 486SX Bargains on the Way

If you can't find your dream machine from our roundup of 25, these latest greatest systems should be shipping by the time you read this. Most of the newcomers have staked their fortunes on the 25-MHz Intel 486SX.

Model	Processor	List price [1]	Fast-RAM Capacity	Free 32-bit slots	Free 16-bit slots	Free 8-bit slots	Drive bays	Compact foot-prints	Warranty (months)	On-site service
AcerPower 486SX	486SX	$3485	98MB	0	4	0	4	Y	24	Y
AcerPower 500	486SX	$3995	128MB	6	0	0	4	Y	24	Y
ALR BusinessVEISA 486ASX	486SX	$4492	49MB	4	1	0	4	Y	12	Y
ALR PowerFlex 486ASX Model 80-B	486SX	$3044	5MB	0	4	1	6	Y	12	Y
ALR PowerPro VM 486ASX	486SX	$7395	49MB	6	2	0	11	N	12	Y
ALR PowerPro/FT 486SX/25	486SX	$6095	49MB	6	2	0	9	N	12	Y
Arche Legacy 386/40	386/40	$4277	32MB	0	6	2	3	N	24	Y
Arche Legacy 486SX-25	486SX	$4357	32MB	0	6	2	3	N	24	Y
Ares 386-40 Sonic	386/40	$2393	32MB	1	7	0	6	N	24	Y
AST Premium II 486SX/20	486SX	$4810	16MB	3	2	1	5	Y	12	Y
ATronics ATI 386B2/40	386/40	$1795	32MB	1	5	1	4	N	12	Y
Austin 386/40 WinStation	386/40	$1790	32MB	0	5	1	5	Y	12	Y
AUVA 354/40	386/40	$2849	32MB	0	7	1	5	N	12	Y
Blue Dolphin 386DX-40 Cache	386/40	$2249	64MB	1	5	0	7	Y	12	N
Club Falcon 386/40	386/40	$2595	64MB	0	5	0	4	N	12	Y
Club Falcon 486SXB/20	486SX	$2695	70MB	0	5	0	4	N	12	Y
Compaq Systempro/LT Model 486SX/25-510	486SX	$7614	64MB	10	0	0	11	N	12	N
Copam 486SXB/25	486SX	$3478	64MB	0	4	0	4	Y	12	Y
Cube 340 ATX	386/40	$3690	64MB	0	6	0	5	Y	12	N
Dell PowerLine 420DE	486SX	$3849	96MB	6	0	0	5	Y	12	Y
Dell PowerLine 420SE	486SX	$5849	128MB	8	0	0	11	N	12	Y
Dell PowerLine 425DE [2]	486SX	$4149	96MB	6	0	0	5	Y	12	Y
Dell PowerLine 425SE [2]	486SX	$6149	128MB	8	0	0	11	N	12	Y
Dell System 486D/20	486SX	$3449	64MB	0	6	0	5	Y	12	Y
Epson Equity 486SX/25 Plus	486SX	[3]	16MB	0	5	1	5	N	12	Y
Everex Step 486SX/20	486SX	$5706	64MB	1	6	1	8	N	12	Y
Exerex Tempo 486SX/20	486SX	$4772	32MB	0	6	2	3	N	12	Y
FCS 386-40	386/40	$1699	32MB	1	6	1	6	N	24	Y
Grid MFP/420s, Model 120	486SX	$2679	32MB	0	3	0	3	Y	12	Y
IBM Model 90 XP 486SX-049 [2]	486SX	$6796	64MB	3	0	0	2	N	12	N
Insight 486SX-20 Cache	486SX	$1995	32MB	0	6	0	8	N	12	N
Intelec 386-40	386/40	$1890	32MB	1	3	2	3	N	12	N
Leading Edge D4/SX20	486SX	$3578	32MB	0	6	0	4	Y	20	Y
Memorex Telex 8080	486SX	[3]	32MB	1	5	0	4	Y	12	Y
Micro Express ME 486-SX/25	486SX	$2139	32MB	0	8	0	5	Y	24	Y
Micro Express ME 486-SX/EISA [2]	486SX	$3194	32MB	0	8	0	5	Y	24	Y
Mitac 4270E	486SX	$3740	64MB	6	0	0	4	Y	12	Y
NCR System 3335 [2]	486SX	$5539	64MB	3	1	0	3	Y	12	Y
NEC PowerMate 486SX/20e	486SX	$4567	64MB	5	0	0	5	N	12	Y
NEC PowerMate 486SX/25e	486SX	$4897	64MB	5	0	0	5	N	12	Y
Northgate Elegance 386/40	386/40	$3299	64MB	0	6	0	5	N	12	Y
Olivetti PC Pro 486 SX	486SX	$2999	36MB	0	3	0	3	Y	12	Y
Packard Bell 486SX	486SX	[4]	32MB	0	4	0	4	N	12	Y
Peregrine 340SF	386/40	$1999	32MB	0	6	0	4	Y	12	Y

Northgate 386/40

PROS: Top-notch support, plenty of slots and bays
CONS: Fairly expensive, no upgrade path

Northgate doesn't crowd you with the design of its 386/40. It has an ample six free slots, and though it's not unusual to find five bays in a conventional desktop case—even a small one like this—these bays are all front accessible. If you want to install two floppy drives, an internal tape backup, a CD ROM player, and a removable-media hard disk, your worries are over. The 386/40's not cheap: At $2599, it's one of the most expensive 386s in the roundup. And the CPU you see is the CPU you get; there's no way to upgrade to a faster 486.

Documentation is good, and it's hard to beat Northgate's service—you get a toll-free tech line that's open 24 hours a day, 7 days a week—plus a year of free, on-site service. Another advantage: The Northgate faithful swear by the programmable Omnikey keyboard. If you're searching for a fast, well-designed 386, take a close look at the Northgate 386/40.

With five front-accessible bays the Northgate won't limit your storage and backup options.

The Swan is the speediest 486SX we tested, and it delivers the best support. Only its price kept it from a Best Buy.

Swan 486SX/25

PROS: Fastest in roundup, clock doubler upgrade, outstanding service and support
CONS: Somewhat expensive

Wait a second till the dust clears—now meet the top gun. Swan's 486SX/25 blazed into first place on every test except *dBASE* and *Paradox*, where it posted second and sixth. You can imagine what kind of throughput it will deliver if you plug in a clock doubler. At $2795 this PC isn't bargain-priced, but you get plenty for your money. The sturdily built desktop box holds five free slots and four drive bays, and the sticker on the back is signed by the assembler.

If you're worried about what will happen if smoke starts pouring from the back, Swan can spare you the ulcer. The company's support package is tops in the roundup: You get two years of on-site service, a toll-free tech support line 365 days a year, and a 30-day money-back guarantee. The Swan's price kept it from a Best Buy, but its number one performance, upgradability, and support make it tough to resist.

Tangent Model 340

PROS: Very fast, built-in graphics accelerator
CONS: Flimsy case, no upgrade path

The Tangent Model 340 is a *Windows* whiz. Check out its scores: This speedy $2383 system rated near the top on every test, and placed third on *Windows*. The Model 340 knocked our socks off with its fast screen writes; its 1024 by 768 VGA card has an integrated graphics accelerator that really speeds up *Windows*. And Tangent includes a monitor that displays a noninterlaced, 1024 by 768 image. The downside? There's no CPU upgrade path, and the case could be more robust—we could see the motherboard and drive bays flexing when we moved the system.

Tangent's superb service and support package includes toll-free technical support, one year of free on-site service, and a comforting 30-day money-back guarantee. So if you're a *Windows* fiend scouting for a powerful workstation, and you can live without an upgrade path to a 486, the Tangent Model 340 is a very good deal.

If you don't feel like shopping for a Windows accelerator, the Tangent Model 340's accelerator really cooks.

Best of the Rest: New 386/40 and 486SX Bargains on the Way *continued*

Model	Processor	List price [1]	Fast-RAM Capacity	Free 32-bit slots	Free 16-bit slots	Free 8-bit slots	Drive bays	Compact foot-prints	Warranty (months)	On-site service
Reply Model 32 486SX/20	486SX	$3087	16MB	5	0	0	5	Y	12	Y
Reply Model 32 486/25	486SX	$3737	16MB	5	0	0	5	Y	12	Y
Sai 386/40	386/40	$1945	16MB	0	5	0	5	Y	12	N
Standard 386-40 Windows Workstation	386/40	$2770	32MB	0	6	0	8	N	24	Y
Standard Computer 386-40 desktop	386/40	$1895	32MB	0	6	0	5	Y	24	Y
Swan 486SX/20	486SX	$3095	32MB	0	4	2	4	N	24	Y
Syntax 340	386/40	$1879	32MB	1	4	0	8	N	12	Y
Tandon Option	486SX	$3977	32MB	0	6	1	4	N	12	Y
Tangent Model 420S	486SX	$2695	64MB	1	7	0	4	N	12	Y
Wang PC44I/20SC	486SX	$5528	28MB	0	4	0	3	Y	12	Y
Wyse Decision 386/40	386/40	$3856	16MB	0	7	0	4	N	12	Y

[1] With 4MB RAM, 80MB to 240MB hard disk, 1.2MB or 1.44MB floppy drive, VGA and VGA color monitor, keyboard, mouse, and DOS. We include a fair estimated cost for components not provided.

[2] 25-MHz system.
[3] Information not available at press time.
[4] Company does not provide list price but expects system to sell for $2400.

WHERE TO BUY

Acer America Corp.
800/733-2237,
408/432-6221 (fax)
Reader service no. 802

Advanced Logic Research Inc.
800/444-4257,
714/581-6770 (fax)
Reader service no. 803

American Mitac Corp.
800/648-2287,
408/432-8519 (fax)
Reader service no. 825

Arche Technologies Corp.
800/422-4674,
510/683-6754 (fax)
Reader service no. 804

Ares Microdevelopment Inc.
800/322-3200,
313/473-4450 (fax)
Reader service no. 805

AST Research Inc.
800/727-4278,
714/727-4141
Reader service no. 806

ATronics Int'l, Inc.
800/488-7776, 510/656-8400, 510/656-8560 (fax)
Reader service no. 807

Austin Computer Systems Inc.
800/752-1577,
512/454-1357 (fax)
Reader service no. 808

AUVA
800/879-2882,
708/832-2858 (fax)
Reader service no. 809

Blue Dolphin Computers Inc.
800/345-0633,
415/259-9898 (fax)
Reader service no. 810

Club American Technologies Inc.
800/368-3288,
510/490-2687 (fax)
Reader service no. 811

Compaq Computer
800/231-0900,
800/345-1518
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800/828-4200,
510/623-8911
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800/522-2823,
914/592-8282
Reader service no. 814

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800/289-3355,
512/338-8700
Reader service no. 815

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800/922-8911,
310/782-5220 (fax)
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Everex Systems
800/992-3839,
510/498-1111
Reader service no. 846

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800/325-1911,
404/441-1856 (fax)
Reader service no. 817

Grid Systems Corp.
800/222-4743,
800/532-4743 (Canada)
Reader service no. 818

IBM
800/426-9292
Reader service no. 819

Insight Computers
800/755-9628,
602/350-1182 (fax)
Reader service no. 820

Intelec Corp.
800/683-0969,
305/477-9074 (fax)
Reader service no. 821

Leading Edge Products Inc.
800/874-3340,
508/836-4800
Reader service no. 822

Memorex Telex Corp.
214/444-3500,
214/444-3586 (fax)
Reader service no. 823

Micro Express
800/989-9900,
714/852-1225 (fax)
Reader service no. 824

NCR Corp.
800/225-5627,
513/445-2008 (fax)
Reader service no. 826

NEC Technologies, Inc.
800/632-4636,
508/264-8032 (fax)
Reader service no. 827

Northgate Computer Systems Inc.
800/548-1993,
612/943-8338 (fax)
Reader service no. 828

Olivetti Office USA
800/527-2960,
908/526-8200
Reader service no. 829

Packard Bell Electronics inc.
818/886-4600
Reader service no. 830

Peregrine Computers
800/326-7015,
513/339-6272 (fax)
Reader service no. 831

Reply Corp.
800/955-5295,
408/942-4897 (fax)
Reader service no. 832

Sai Systems Laboratories
800/331-0488,
203/929-6948 (fax)
Reader service no. 833

Standard Computer Corp.
800/662-6111,
818/337-2626 (fax)
Reader service no. 835

Swan Technologies
800/468-9044,
814/237-4450 (fax)
Reader service no. 836

Syntax Computer, Inc.
800/552-8900,
818/854-6366 (fax)
Reader service no. 837

Tandon Corp.
800/800-8850,
805/529-8408 (fax)
Reader service no. 838

Tangent Computer Inc.
800/223-6677,
415/342-9388 (fax)
Reader service no. 839

Wang Laboratories, Inc.
800/835-9264
Reader service no. 840

Wyse Technology
800/438-9973,
408/473-1972 (fax)
Reader service no. 841

Touche 5550T 486SX 20

PROS: Solid performance, two-year warranty, eight drive bays, clock doubler upgrade
CONS: Fairly pricey

The Touche 5550T is a 20-MHz 486SX, but it came in second on *Paradox* and third on *WordPerfect*—and you can pick up the tempo some more with a 20/40-MHz clock doubler. This racehorse gallops out of the gate with eight drive bays; four are filled with two floppy drives, a 213MB hard drive, and a CD ROM player. Touche tops off this quality package with a noninterlaced Sony monitor. The heavy case is easy to get off, and the design lets air circulate on both sides of the motherboard. Ever scratched your head trying to figure out where the wire you disconnected goes? You'll appreciate the clearly labeled leads, slots, and ports.

There's a 24-month warranty, and tech support was generally good. The Touche gives more standard equipment than you may need, and makes you pay $2797 for it, so many users will look elsewhere. But if you need tons of storage, it may be right up your alley.

If you're looking for plenty of storage, including a standard CD ROM player, the fast Touche is worth the high price.

The Superset's innovative slim design gives you that classy executive look, but you'll have to pay for it.

Twinhead Superset 600/420C

PROS: Good support, inexpensive chip and clock upgrade
CONS: Over $3000

The Superset 600/420C is a nifty little slimline 486SX/20 with an upgradable CPU future. The present, however, isn't quite as impressive—this machine has average 20-MHz performance—and the $3049 price doesn't appeal. You can convert the Superset to a racy 33-MHz 486DX with an upgrade kit that includes clock crystal, BIOS, cache controller, and CPU for only $499. This is one of the best upgrade deals around, and the system also supports the clock doubler. Twinhead designed room for peripherals into the low case by placing the four free slots on a 16-bit card that holds boards horizontally.

Twinhead service is good, with a year of free on-site service, toll-free tech support, and a 48-hour repair turnaround. This svelte PC is a real eye-catcher. If you can get past its steep price and limited expandability, you may want to give it a home on your desktop.

ZDS Z-486SX/20E

PROS: EISA bus, very good service and support, nice design
CONS: Very expensive

For a pricey $4009, Zenith Data Systems will sell you a reasonably fast 20-MHz 486SX. You can speed it up further with a clock doubler, and if you're hooked to a network, plugging the right 32-bit board into the Z-486SX/20E's EISA bus can quicken LAN I/O. The compact case is beautifully designed, and the standard configuration includes a 200MB hard disk plus a ZCM-1492 monitor with one of the best pictures in the roundup—a flat-black screen with brilliant colors and sharp detail. The unit isn't your best choice as a stand-alone: You get only three bays and three slots. True, the slots are all EISA, but that's not much headroom.

You get an excellent animated demo and great documentation. Support is through dealers only, but it's very good. The Z-486SX/20E is a fairly good deal, but for many users it won't be fast enough or expandable enough to warrant the high price.

Some nice extras come standard with the Z-486SX/20E, but the price is steep and expandability limited.

Zeos 486SX-20

PROS: Abundant slots and bays, inexpensive 486DX upgrade, Windows included

CONS: Slow, fairly expensive

Zeos is another direct-sale company that built its reputation on solid machines at bargain prices, but the 486SX-20 fell short. It placed last in overall performance, and the $2695 price is no bargain. We did like the tower case with its outstanding seven free slots and eight drive bays and a choice of several upgrade paths: You can slip in a clock doubler, or install a new 33-MHz 486DX processor board. The board upgrade option is a reasonable $695, and if you swap within 30 days of purchase Zeos will sell you the board for $200. (If this deal is on when you read this, taking Zeos up on it may net you one of the best deals of all.)

Service and support are strong, with on-site service and toll-free tech support that works 24 hours a day, seven days a week. But unless you go for the sizzling upgrade deal right out of the gate, the combination of slow performance and high price is hard to overcome.

The Zeos is slow, but an expandable tower case and flexible upgrade options are appealing.

WHERE TO BUY

ALR BusinessStation 486ASX
Advanced Logic Research
9401 Jeronimo
Irvine, CA 92718
800/444-4257,
714/581-6770 (fax)
LIST PRICE: 2MB RAM, 1.44MB floppy, 120MB drive, 1024 by 768 VGA and color display, 1 parallel, 2 serial, 1 mouse ports $2895; w/4MB RAM, $3095; w/5MB RAM, 200MB drive $3495
ACCESSORIES: 1MB RAM $149, 4MB $449; EISA controller $895; SCSI adapter $299
Reader service no. 780

Arche Master 386/40
Arche Technologies
48502 Kato Rd.
Fremont, CA 94538
800/422-4674,
510/683-6754 (fax)
LIST PRICE: 4MB RAM, 1.2MB or 1.44MB floppy, 1 parallel, 2 serial ports, keyboard, mouse, DOS, Windows $3349; w/120MB drive, 1024 by 768 VGA and color display $4898
ACCESSORIES: 4MB RAM $400; 486DX/33 upgrade $1700; floppy $99; 200MB drive $999
Reader service no. 781

ATronics ATI 486SX/20
ATronics Int'l
45635 Northport Loop E
Fremont, CA 94538
800/488-7776,
510/656-8560 (fax)
LIST PRICE: 1MB RAM, 1.2MB or 1.44MB floppy, 120MB drive, 1024 by 768 VGA and color display, 1 parallel, 2 serial, 1 game ports, keyboard, mouse, DOS $1995; w/4MB RAM $2145
ACCESSORIES: 1MB RAM $50; floppy $58; removable 120MB drive instead of fixed 120MB add $69; 1MB caching drive controller $299; tape backup $375
Reader service no. 782

Austin WinStation 486SX/20
Austin Computer
10300 Metric Blvd.
Austin, TX 78758
800/752-1577,
512/454-1357 (fax)
LIST PRICE: 4MB RAM, 1.2MB or 1.44MB floppy, 125MB drive, 1024 by 768 VGA and color display , 1 parallel, 2 serial ports, keyboard, mouse, DOS, Windows $2842
ACCESSORIES: 1MB RAM $79; floppy $79; 200MB instead of 125MB drive $370; tape backup $299
Reader service no. 783

Blackship BLK 386/40, Blackship BLK 486SX/20
Blackship Computer
2031 O'Toole Ave.
San Jose, CA 95131
800/531-7447,
408/432-1443 (fax)
LIST PRICE: BLK 386/40 w/4MB RAM, 1.2MB or 1.44MB floppy, 120MB drive, 1024 by 768 VGA and color display , 1 parallel, 2 serial, 1 game ports, keyboard, mouse, DOS, Windows $2320; BLK 486SX/20 $2420
ACCESSORIES: 4MB RAM $200; 33-MHz 486DX upgrade $795 minus trade-in; floppy $70; 200MB drive $240; 80MB/120MB tape backup $285
Reader service no. 784

Compaq Deskpro 486s/25M
Compaq Computer
20555 SH 249
Houston, TX 77070
800/231-0900,
800/345-1518
LIST PRICE: 4MB RAM, 120MB drive, 1024 by 768 VGA, 1 parallel, 2 serial, 1 mouse ports, keyboard $4599; w/color display, DOS $5397
ACCESSORIES: 2MB RAM $319, 4MB $629; 33-MHz 486DX processor card $1499 w/trade
Reader service no. 785

CompuTrend 386/40C
CompuTrend Systems
1306 John Reed Ct.
City of Industry, CA 91745
800/677-6477,
818/333-5121
LIST PRICE: 4MB RAM, 1.2MB and 1.44MB floppies, 130MB drive, 1024 by 768 VGA and color display, 1 parallel, 2 serial ports, keyboard, DOS, Windows $1775
ACCESSORIES: none listed
Reader service no. 786

CUI Advantage 386-40CX
CUI
1680 Civic Center Dr. #101
Santa Clara, CA 95050
800/458-6686,
408/241-2487 (fax)
LIST PRICE: 1MB RAM, 1.2MB floppy, 1 parallel, 2 serial, 1 game ports, keyboard $895; w/4MB RAM, 105MB drive, 1024 by 768 VGA and color display , mouse, DOS, Windows $1995
ACCESSORIES: 4MB RAM $200; floppy $65; 210MB instead of 105MB drive $300
Reader service no. 787

Dell System 486D/25
Dell Computer.
9505 Arboretum Blvd.
Austin, TX 78759-7299
800/289-3355,
512/338-8700 (fax)
LIST PRICE: 4MB RAM, 1.2MB or 1.44MB floppy, 80MB drive, 1024 by 768 VGA and color display , 1 parallel, 2 serial, 1 mouse ports, keyboard, mouse, DOS $3299
ACCESSORIES: 4MB RAM $399; 25-MHz 486DX factory upgrade $499, 33-MHz 486DX factory upgrade $899; floppy $99; 200MB IDE

WHERE TO BUY

hard drive $899; 200MB SCSI hard drive/controller $1199; 330MB ESDI drive/controller $1699; 1024 by 768 VGA display $599
Reader service no. 788

DTK KEEN-4000
DTK Computer
17700 Castleton St. #300
City of Industry, CA 91748
800/827-9385, 818/810-5233 (fax)
LIST PRICE: motherboard, processor, power supply, case $1175
ACCESSORIES: 8MB RAM $560, unpopulated 8MB RAM card $99; floppy $75; 200MB drive $895; 1024 by 768 VGA $135, color display $450
Reader service no. 789

Eltech Model 3400, Eltech Model 4200
Eltech Research
47266 Benicia St.
Fremont, CA 94538
800/358-8330, 510/438-0663 (fax)
LIST PRICE: Model 3400 386/40 w/4MB RAM, 1.2MB and 1.44MB floppies, 100MB drive,1024 by 768 VGA and color display , 1 parallel, 2 serial ports, keyboard, mouse, DOS, Windows, PFS: Window Works $2219; Model 4200 486SX/25 $1964
ACCESSORIES: 2MB RAM $120; floppy $60; 200MB instead of 100MB drive $350; 512K caching IDE controller $300; tape backup $399
Reader service no. 790

FastMicro FastData 486SX/25
FastMicro
4405 E. Baseline Rd.
Phoenix, AZ 85044
800/821-9000, 602/437-2300 (fax)
LIST PRICE: 4MB RAM, both floppies, 105MB drive, 1024 by 768 VGA and color display , keyboard, mouse, DOS, Windows $1999
ACCESSORIES: 4MB RAM $196; floppy $59; 200MB instead of 105MB drive $300; tape drive $239
Reader service no. 791

Hewlett-Packard Vectra 486s/20
Hewlett-Packard
19310 Pruneridge Ave.
Cupertino, CA 95014
800/752-0900
LIST PRICE: 4MB RAM, 1.2MB or 1.44MB floppy, 1024 by 768 VGA, 1 parallel, 2 serial, 1 mouse ports, keyboard $4099; w/120MB drive,1024 by 768 color display, mouse, DOS $6006
ACCESSORIES: 2MB RAM $299, 4MB RAM $499; 20-MHz 80487SX coprocessor $1349; floppy $239; 240MB drive $1789; EISA SCSI adapter $999
Reader service no. 792

Hyundai CS-386/40, Hyundai CS-486SX/20
Hyundai Electronics America
166 Baypointe Pkwy.
San Jose, CA 95134
800/627-7978, 408-473-9200
LIST PRICE: CS-386/40 w/4MB RAM, 1.2MB or 1.44MB floppy, 100MB drive, VGA and color display , 1 parallel, 2 serial ports, keyboard, mouse, DOS $3795; CS 486SX/20 $3965
ACCESSORIES: 33-MHz 486DX CPU board upgrade $1695
Reader service no. 793

Micro Express ME 386-40
Micro Express
1801 Carnegie Ave.
Santa Ana, CA 92705
800/989-9900, 714/852-1225 (fax)
LIST PRICE: 4MB RAM, 1.2MB floppy, 1 parallel, 2 serial ports $1075; w/120MB drive, 1024 by 768 VGA and color display , keyboard w/built-in mouse, DOS $2064
ACCESSORIES: 1MB RAM $100; floppy $75; 200MB drive $700; 80MB/120MB tape backup $300; coprocessor $345
Reader service no. 794

Northgate 386/40
Northgate Computer
7075 Flying Cloud Dr.
Eden Prairie, MN 55344
800/548-1993, 612/943-8338 (fax)
LIST PRICE: 2MB RAM, 1.2MB or 1.44MB floppy, 52MB drive, VGA and color display , 1 parallel, 2 serial ports, keyboard, mouse, DOS, Windows $1899; w/100MB drive, 800 by 600 VGA and color display $2599
ACCESSORIES: 4MB RAM $200; floppy $100; 200MB drive $600; 1024 by 768 VGA card and display $500; 40MB/60MB tape backup $299
Reader service no. 795

Swan 486SX/25
Swan Technologies
3075 Research Dr.
State College, PA 16801
800/468-9044, 814/237-4450 (fax)
LIST PRICE: 4MB RAM, 1.2MB and 1.44MB floppies, 120MB drive, 1024 by 768 VGA and color display , 1 parallel and 2 serial ports, keyboard, mouse, DOS, Windows, MS Works for Windows, Quicken for Windows, Wealthbuilder $2545; w/220MB drive $3045
ACCESSORIES: none listed
Reader service no. 796

Tangent Model 340
Tangent Computer
197 Airport Blvd.
Burlingame, CA 94010
800/223-6677, 415/342-9380 (fax)
LIST PRICE: 4MB RAM, 1.2MB floppy, 120MB drive, 1024-by-768 VGA w/GUI accelerator and color display, 1 parallel, 2 serial ports, keyboard, mouse, DOS, Windows $2595
ACCESSORIES: 4MB RAM $200; floppy $89; 207MB drive $700 (upgrade $325); 80MB/120MB tape backup $358
Reader service no. 797

Touche 5550T 486SX 20
PC Pros/Touche
8205 S. Cass Ave.
Darien, IL 60559
708/810-1010, 708/810-9490 (fax)
LIST PRICE: 4MB RAM, both floppies, 1024 by 768 VGA w/noninterlaced color display, 213MB drive, 1 parallel, 2 serial ports, internal CD ROM, keyboard, mouse, DOS, Windows $2797
ACCESSORIES: 4MB RAM $99; 340MB ESDI drive w/caching controller (upgrade) $399; 80MB/120MB tape backup $249; CD library $99
Reader service no. 798

Twinhead Superset 600/420C
Twinhead
1537 Centre Pointe Dr.
Milpitas, CA 95035
800/545-8946, 408/945-0808 (fax)
LIST PRICE: 2MB RAM, 1.2MB floppy, 1024 by 768 VGA, 1 parallel, 2 serial ports, keyboard, mouse, DOS, Windows $2099; w/4MB RAM, 100MB drive, VGA color display $2999
ACCESSORIES: 1MB RAM $100; 33-MHz 486DX upgrade kit $499; floppy $99; 100MB drive $350, 200MB drive $650
Reader service no. 799

ZDS Z-486SX/20E
Zenith Data Systems
2150 E. Lake Cook Rd.
Buffalo Grove, IL 60089
708/808-5000
LIST PRICE: 4MB RAM, 1.44MB floppy, 200MB drive, VGA and color display , 2 parallel, 2 serial ports, keyboard, mouse, DOS, Windows, security tie-down case $5799
ACCESSORIES: 1MB (SIMM) RAM $199, 4MB (SIMM) RAM $599; TIGA card $789
Reader service no. 800

Zeos 486SX-20
Zeos Int'l, Ltd.
530 5th Ave. N.W.
St. Paul, MN 55112
800/423-5891, 612/633-1325 (fax)
LIST PRICE: 1MB RAM, 1.2MB or 1.44MB floppy, 42MB drive, Hercules card, monochrome display, 1 parallel, 2 serial, 1 game ports, keyboard $1595; w/4MB RAM, 2 floppies, 130MB drive, 1024 by 768 VGA and color display, mouse, DOS, Windows, 1-2-3 for Windows, Ami Pro 2.0 $2595
ACCESSORIES: 1MB RAM $82.50; 33-MHz 486 upgrade $695 ($200 trade back within 30 days of purchase); 80MB/120MB tape backup $395; 210MB drive (upgrade) $290, 330MB SCSI drive w/controller $1210, 674MB SCSI drive w/controller $1610
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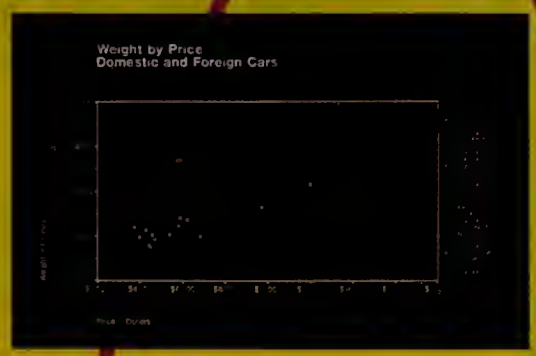

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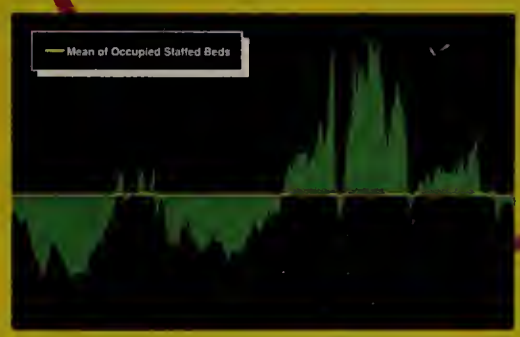

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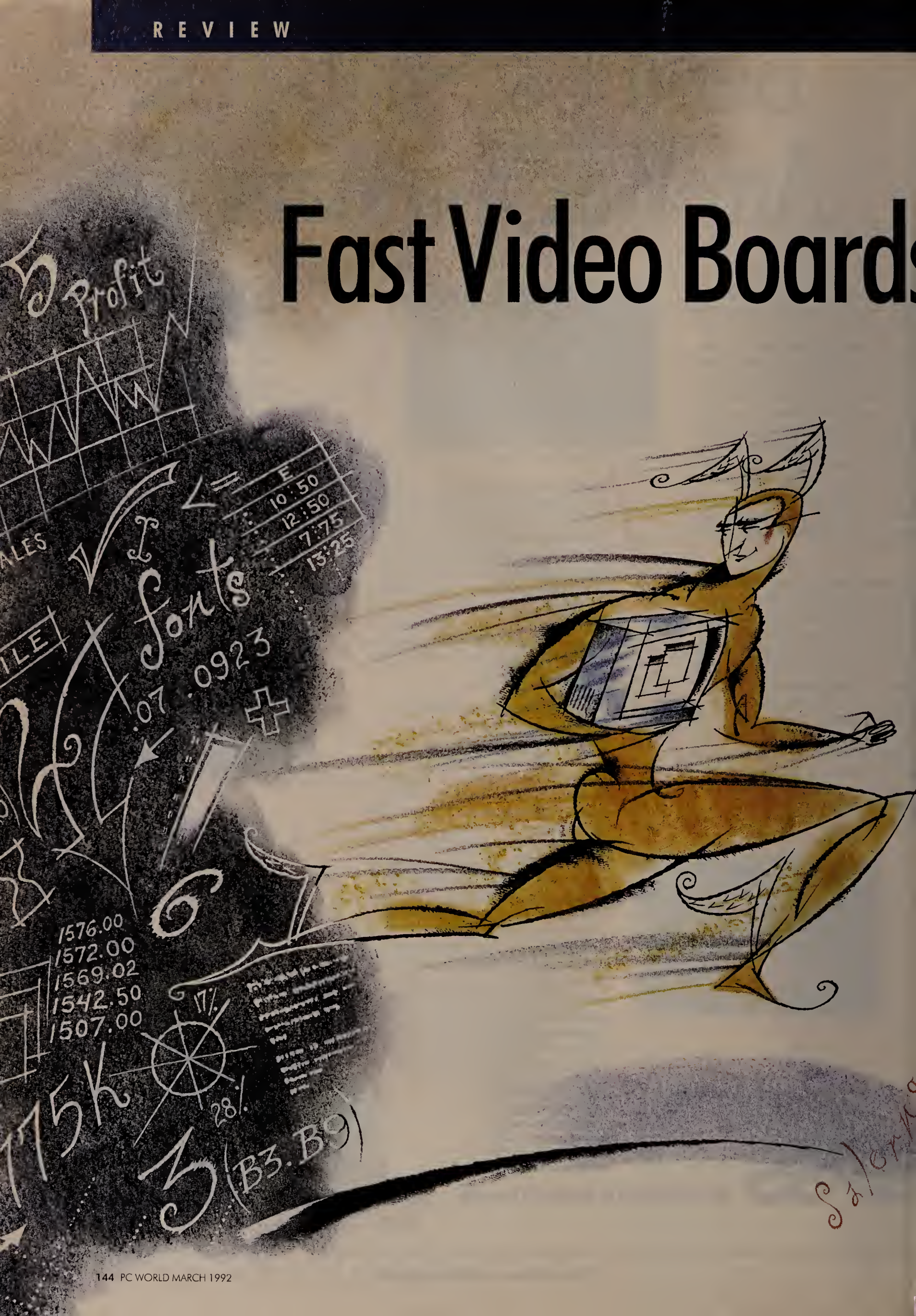


For Windows

BY TJ BYERS

Tired of sluggish Windows displays? One of these 21 graphics accelerator boards may do more to boost performance than buying a faster system.

Your brand-new superfast 386 has finally arrived. Atop it sits the fancy, super-VGA color monitor you talked yourself into. If this setup doesn't make *Windows* run right, nothing will.

You boot up and *Windows* looks fabulous at more than twice its former VGA resolution. But wait a minute. Opening a window seems to take just as long as it used to, though your new PC is supposed to be twice as powerful as the old one!

Welcome to the video bottleneck. Your system's CPU may be shoveling screen data at a tremendous clip, but if you use graphics-intensive applications, a plain old VGA or super-VGA board may be too wimpy to keep up—especially if you're working at resolutions beyond 640 by 480. For certain applications, a fast video board may actually buy more performance, dollar for dollar, than upgrading your system.

What do we mean by fast? We're referring to video cards that have their own graphics coprocessor on board, cards that are specifically designed to pull their weight in today's graphics-clogged world. In this review we've rounded up 21 such boards, which cost from about $100 to $900 on the street, and at their best offer speed increases of 200 to 450 percent over super-VGA at the same resolutions. Many of these boards were released just as we reached our deadline, and in this competitive field, we were pleased to find that the cheapest boards aren't necessarily the slowest.

Our testing focused on *Windows* rather than DOS applications for one simple reason: These boards are designed specifically to speed up *Windows*. With most DOS-based packages, disk or CPU performance is usually more of a constraint than video throughput, so you'd probably reap greater benefits from upgrading those components than from buying a new video card. *Windows* programs, on the other hand, need as much video acceleration as they can get.

In our tests, we found surprising performance differences depending on which *Windows* program we ran. Boards equipped with the *Windows*-oriented S3 coprocessors, for example, run *Excel* and *Word for Windows* 2½ to 3 times faster. But to our surprise, none of the 21 boards reviewed accelerated *PowerPoint* slide shows radically—and many of the S3 boards actually decreased performance to one-third that of super VGA. We confirmed these results when we found much the same performance using other presentation graphics packages, including *Hollywood,* a PC World Best Buy (in the November 1991 issue).

To run *Windows* applications at resolutions higher than standard VGA, you need to install the *Windows* video driver that is bundled with each board. Most of the boards include both 800 by 600 and 1024 by 768 *Windows* drivers, and several of them add support for 1280 by 1024. Most boards can display 256 simultaneous screen colors at 1024 by 768 resolution, and some even support 65,536 colors for such applications as previewing 35mm slides or photo retouching. Most of the

STEVEN SALERNO

boards also offer video drivers for popular DOS applications, such as *AutoCAD* and *1-2-3*, but not all deliver the speed benefits that they do under *Windows*.

To make things easier on your eyes, most of the boards support noninterlaced scanning at resolutions up to 1024 by 768, and many also provide a 70- or 72-Hz refresh rate to reduce flicker. Only four boards lack support for a high refresh rate: the Artist Graphics WinSprint 200, the BCC TIGA-10, the Enertronics Aurora 1024, and the Hercules Graphics Station+2. To take advantage of flicker-free display at high resolutions, make sure you have the appropriate multiscan monitor (see "Mix and Match Multiscans").

Another important buying consideration is whether the board can run off-the-shelf DOS software written for standard VGA. For that you need a VGA controller, and several boards reviewed in this article don't come with one. Instead, you have to connect the graphics board to an existing VGA board (or to the VGA built into your system's motherboard) using a pass-through cable.

To help you get the best board for your buck, we installed each board and tested it on a 33-MHz 386 at super-VGA resolutions using *Excel, Word for Windows,* and *PowerPoint.* Our results can be boiled down to a single piece of advice: Because speed improvements vary widely by application, it's best to test your software before making a purchase. And since setting up these boards isn't always a picnic, check our reports on installation procedures and manufacturer support policies.

The good news? All our Best Buys go to inexpensive boards. At the low end, the Aamazing VGA700 takes the prize for its significant speed improvements and amazing $118 estimated street price. In the midrange, we encountered high-performance Best Buys with street prices that were still astonishingly low: the $352 Diamond Stealth Hicolor, the $461 ATI Graphics Ultra, and the $373 ATI Graphics Vantage. (All prices in this review are street prices for 1MB configurations, except for boards with a 512K limit.)

Little more than one year ago, you would have paid the same for a super-VGA board as you would pay for one of these Best Buy graphics speed boards. True, we must stress that it's important to "try before you buy" due to the inconsistent, application-dependent speed increases offered by these boards. But if you match one of the boards reviewed with the right applications and a flicker-free multiscan monitor for the best possible view, you'll make *Windows* a far, far better place to work for a remarkably low cost.

TJ Byers is a contributing editor for PC World.

For more information about all products in this article, circle reader service no. 902.

Buying Smart: First, Check Your Software

If you use *Windows* applications at resolutions beyond the standard 640 by 480, a fast graphics board may do wonders for performance. Surprisingly, many of the boards reviewed here cost little more than the price a year ago of a garden-variety super-VGA board. Note, however, that actual performance improvements vary greatly depending on the type of applications you use.

PERFORMANCE

All the graphics boards posted speed gains, but the vast differences among applications warrant some caution. If you use scroll-intensive applications, such as *Excel* or *Word for Windows,* you can expect your software to run up to three or four times faster, depending on the board. But other application tests produced mixed results. For example, *PowerPoint* and similar slide presentation packages actually fared worse than when run using a super-VGA card, often slowing to one-third the speed of standard super VGA. Before you write that check, test the boards with your own applications or choose one that offers a money-back guarantee.

PRICE

How much speed can you get for your buck? To tell the real story we rated the boards according to their *street price,* determined by anonymously calling three dealers in eight major U.S. cities and averaging their price quotes. When a board was too new to be widely available, we estimated its street price. Our conclusions? You'd better shop around—extra-cheap boards like the Aamazing VGA700 can be very good deals.

IMAGE QUALITY

When using *Windows,* a flicker-free display is a must. Standard VGA boards repaint (refresh) the screen image just 60 times per second (60 Hz), creating an eye-wearying flicker—especially noticeable on *Windows'* light-colored screens. Fortunately, many boards provide flicker-free scan rates of 70 Hz and faster, which all but eliminates the problem.

Such ergonomic operation isn't cheap. Your board's supported resolution modes may include any combination of 640 by 480, 800 by 600,

1024 by 768, and even 1280 by 1024. As the resolution increases—and if you demand flicker-free performance at all resolutions—the monitor's price also increases. Make sure your monitor can take advantage of all the board has to give (see "Mix and Match Multiscans").

If your main applications involve desktop publishing, graphics, or creating slides, you'll want a board that displays more than 16 colors. The number of colors depends on the driver and the amount of RAM on the graphics board. As a rule, these boards need 512K of RAM to produce 256 colors at a resolution of 640 by 480 but need at least 1MB of RAM to generate 256 colors at 800 by 600 resolution or higher. If you have one of the few high-end graphics applications for *Windows*—for, say, photo retouching—you'll like the 32,786 or 65,536 colors some of these boards provide.

EASE OF INSTALLATION

Installing a video board should be a plug-and-play operation, but only half of these boards are that intuitive. The others may need DIP switches flipped or a jumper switched.

Users who already have a VGA or super-VGA board may want to consider a board that lacks the capability to run standard VGA software. These boards come with a special "pass-through" cable that connects to the already installed VGA. Pass-through cables often have limited extension, so you may have to play musical cards before the cable's ends meet. In addition, many VGA boards fail to sense color monitors when attached to pass-through connectors and come up in monochrome—something you can determine only by calling the manufacturer or testing the board yourself.

After the board is installed you'll have to install software drivers to benefit from enhanced speed, colors, and resolution. Setup choices can be vast, so look for a board that offers menu-driven driver installation.

SOFTWARE SUPPORT

All the video boards come with a *Windows* video driver that lets you run applications at the two super-VGA resolutions, 600 by 800 and 1024 by 768. The advantage of the *Windows* driver is that you load it once and all your *Windows* applications benefit from the speed and resolution enhancements.

If you want to run DOS applications, however, you'll need to install a software driver for each one. Many, but not all, of the boards in this roundup come with super-VGA drivers for *1-2-3, AutoCAD* and *WordPerfect*. Without a driver, DOS programs will run at the standard 640 by 480 VGA resolution.

SERVICE AND SUPPORT

Since these boards are trickier to install than super-VGA cards, a technical support hot line is a must (toll free, preferably). If you use the board for applications other than *Windows*, or plan to upgrade to *Windows 3.1*, being able to download the most recent drivers from an electronic bulletin board service is a big plus, as are a long warranty and a money-back guarantee.

Aamazing VGA700

Aamazing's VGA700 is a decent performer for a low $118 (estimated) street price. While it's not the fastest *Windows* accelerator, its rock-bottom price earns it a Best Buy.

The VGA700 board ran *Excel* and *Word for Windows* better than twice the normal pace of super VGA, and it's also one of the few boards reviewed that sped *PowerPoint*. However, it's not your best choice for presentation graphics because its 1024 by 768 screens are limited to 16 colors.

The VGA700 supports flicker-free operation at resolutions up to 1024 by 768. It's also easier to install than other boards: Just plug it in and install the drivers using menu-driven software. By providing good performance at incredibly low cost, the Aamazing VGA700 earns a well-deserved Best Buy.

PROCESSOR TYPE: AcuMos

MAXIMUM RESOLUTION: 1024 by 768

WORTH NOTING: Lowest cost, switchless setup

BUILT-IN VGA: Yes

Actix Quantum

★ PROCESSOR TYPE: S3
★ MAXIMUM RESOLUTION: 1280 by 1024
★ WORTH NOTING: Low price, money-back guarantee
½ BUILT-IN VGA: Yes

The Actix Quantum is one of eight boards in this roundup that use the S3 accelerator chip. Its $299 estimated street price is the lowest of the S3 boards, making it a very good value.

Like most S3 boards, the Quantum sped *Excel* and *Word for Windows* by more than 2½ times, but ran *PowerPoint* at about one-third the speed of super VGA.

If your applications support thousands of colors, you'll appreciate the Quantum's ability to display 32,768 screen colors at 640 by 480. It offers a maximum resolution of 1280 by 1024 with 16 colors, but the flicker caused by interlaced scanning may have you using the noninterlaced 1024 by 768 mode.

The board installs fairly easily and comes with a 30-day money-back guarantee. Because of its low price and good performance, the Quantum is a solid deal.

Artist Graphics WinSprint 200

★ PROCESSOR TYPE: TI 34020
★ MAXIMUM RESOLUTION: 1024 by 768
½ WORTH NOTING: Speedy, high price, flicker
BUILT-IN VGA: No

The full-length WinSprint 200 is one of only four cards that use the ultra-swift TI 34020 graphics chip. But given its high $786 estimated street price and lack of support for 70-Hz refresh, there are better deals.

The WinSprint 200 is one of the fastest boards we reviewed. In our tests, it posted gains of nearly 400 and 300 percent with *Excel* and *Word for Windows*, respectively. Even *PowerPoint* improved by more than 10 percent over super VGA. But the board's downfall is its 60-Hz flicker, which persists at the only supported resolution, 1024 by 768. Moreover, driver support is limited to *Windows;* the WinSprint 200 doesn't support *AutoCAD* and other DOS programs.

Installation requires fussing with a VGA pass-through cable to connect the WinSprint 200 to a companion VGA card. Although the board is fast, its high cost, 60-Hz screens, and lack of DOS drivers make other boards more appealing.

ATI 8514-Ultra

★ PROCESSOR TYPE: ATI Mach 8
★ MAXIMUM RESOLUTION: 1280 by 768
★ WORTH NOTING: Easy installation, excellent fonts
½ BUILT-IN VGA: No

The $438 8514-Ultra has a dual personality. One side of the flippable adapter card plugs into a PS/2, the other side into an AT slot. Either way, the 8514-Ultra offers good performance, flicker-free operation, and support for 256 colors.

The 8514-Ultra tripled *Excel* and *Word for Windows* performance and ran *PowerPoint* a little more than half as fast as super VGA. Unlike most boards, the ATI provides custom antialiasing Crystal fonts, which sharpen text considerably at 1024 by 768 resolution.

When installed in an AT, the 8514-Ultra supports only 1024 by 768 resolution unless you connect it to a VGA board—a messy process. The 8514-Ultra is a very good product, but non-PS/2 users will prefer ATI's Graphics Ultra, which has VGA built in, or the even less expensive Graphics Vantage.

ATI Graphics Ultra

★ PROCESSOR TYPE: ATI Mach 8
★ MAXIMUM RESOLUTION: 1024 by 768
★ WORTH NOTING: Easy installation, excellent fonts
★ BUILT-IN VGA: Yes

The Graphics Ultra ties with the ATI 8514-Ultra as one of the faster boards tested here, running *Excel* and *Word for Windows* at least three times faster than super VGA. But the AT-only $461 Graphics Ultra comes with built-in VGA and a free mouse, making it a better deal and the fastest Best Buy.

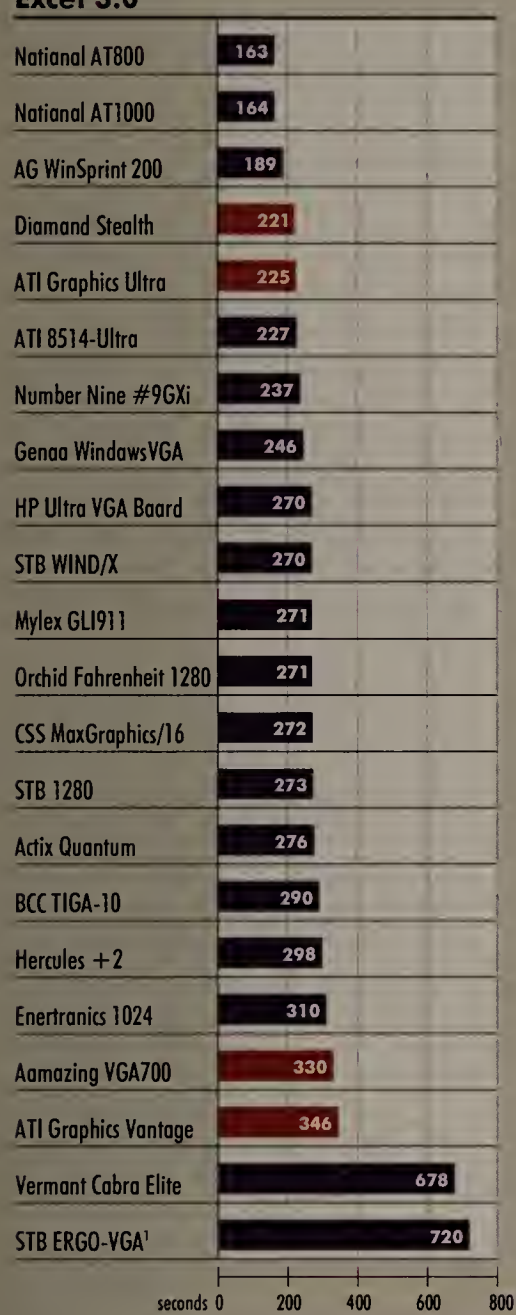
The three resolutions supported by this board display 256 colors without flicker. If you install ATI's Crystal fonts, 1024 by 768 screens are far easier to read than they are using standard *Windows* fonts. Crystal fonts support a maximum of 20 colors, but some dithered colors produce comics-like dotting. You also get 13 PostScript and LaserJet screen fonts.

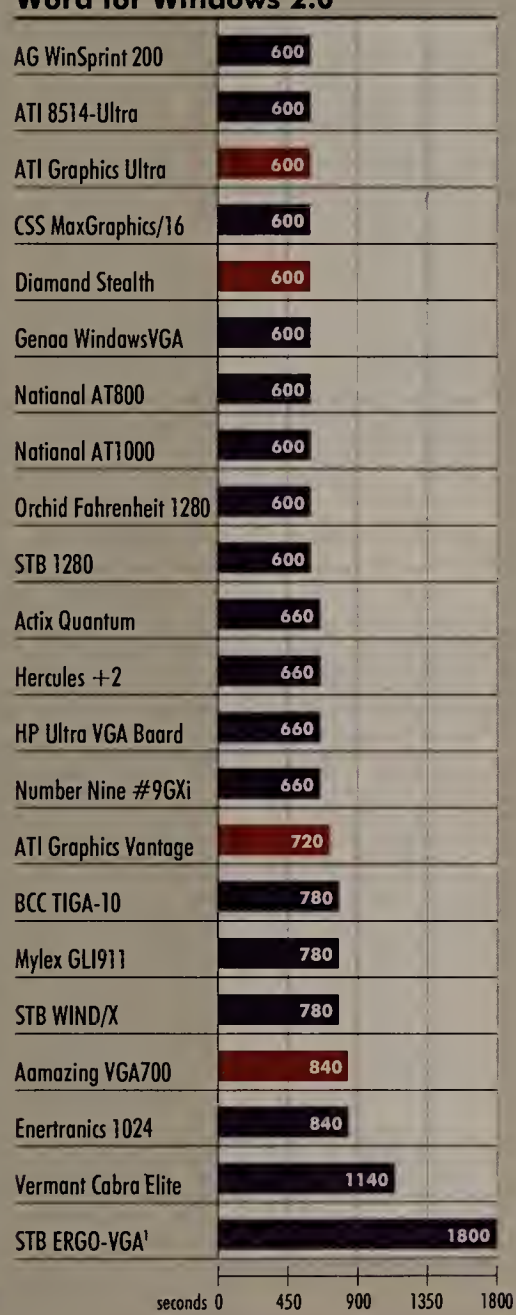
The Graphics Ultra is an excellent piece of hardware that offers plenty of extras, and it's easy to install. But if you can live with less speed, the less expensive Graphics Vantage, also from ATI, is a slightly better value.

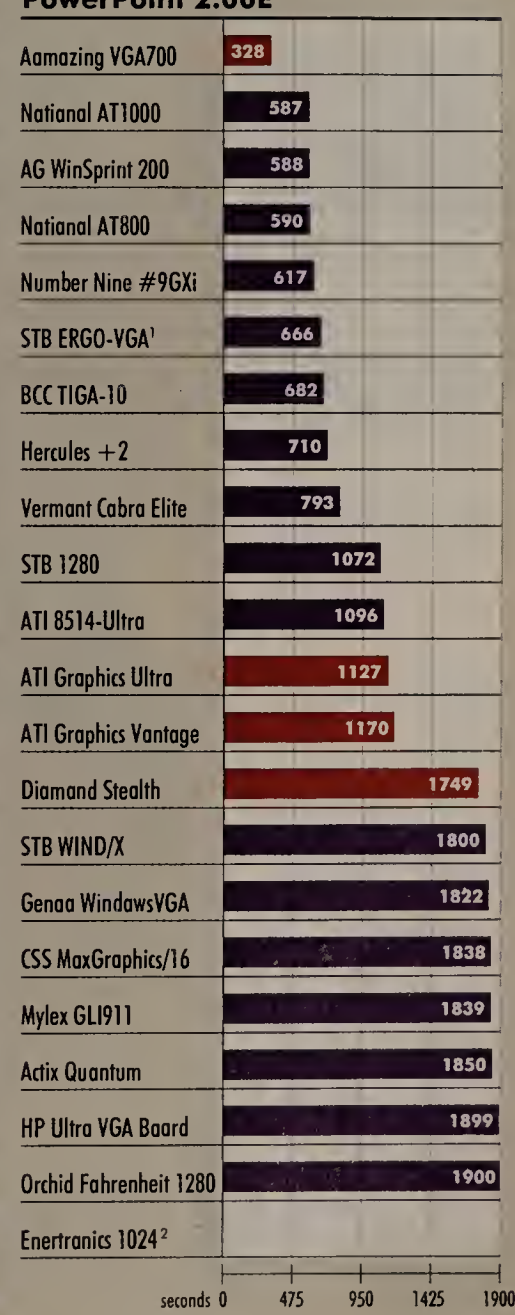
National and Artist Graphics Grab Top Honors

The AG WinSprint 200 and the National Design Volante AT800 and AT1000 boards turned in the fastest performance overall, running Excel about 4 times faster and Word for Windows 3 times faster than a standard super-VGA board. Almost all the boards improved Excel and Word for Windows performance by at least 2 times, but with PowerPoint many actually performed far worse than super VGA.

BEST BUY







[1] Listed for comparison.

[2] Board failed to perform test.

Methodology
We tested all the boards with 1MB of video RAM, except for the Amazing VGA700, which supports only 512K, and the STB 1280 Graphics System, which required 2MB. The tests were run at 1024 by 768 resolution with 256 colors, except those for the Amazing VGA700, which supports only 16 colors at that resolution. A Dell System 333D running Microsoft DOS 5.0 at 33 MHz was the test system. The benchmarks didn't require hard disk access once loaded, and that is not a factor in the reported times.

Excel 3.0
A 256-by-256-cell spreadsheet, fully packed with 10 characters per cell, is placed in a window on the screen and then maximized. Next, we scroll the spreadsheet, page by page, three times. This test measures the short-vector line drawing speed, which is representative of most spreadsheets and draw programs.

Word for Windows 2.0
A 1.44MB text document is placed on screen and scrolled from top to bottom, line by line. This test measures the Bit Block (BitBlt) speed, which is representative of all Windows word processing programs.

PowerPoint 2.00E
A slide show consisting of 120 slides is automatically paraded on screen at the rate of one slide per second. Ideally, the show should last 2 minutes. This test measures the bit-map speed, which is representative of presentation graphics and draw programs.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

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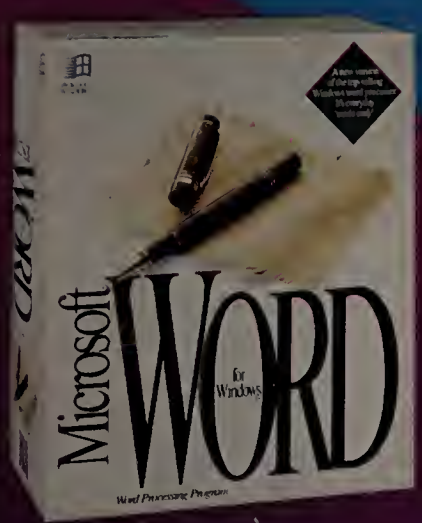

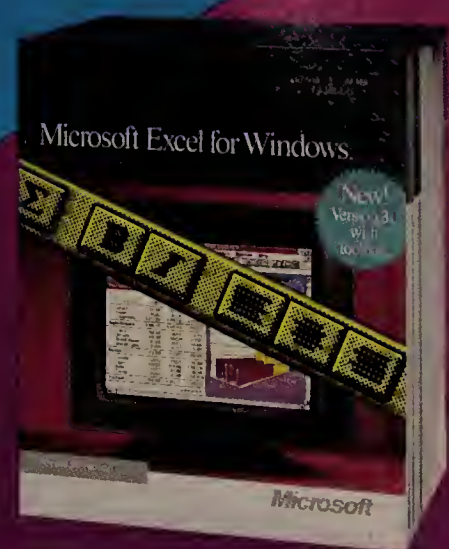

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FEATURES EVALUATION

Fast Video Boards for Every Budget

Enjoy faster Windows with a bigger work space for little more than the price of a standard VGA board.

● Yes
○ No
n/a = not applicable

	Amazing VGA700	Actix Quantum	Artist Graphics WinSprint 200	ATI 8514-Ultra	ATI Graphics Ultra	ATI Graphics Vantage	BCC TIGA-10	CSS MaxGraphics/16	Diamond Stealth Hicolor
Standard features									
Street price[1]	$118	$257/$299	$786	$373/$438	$438/$461[2]	$355/$373[2]	$391	$391	$352
List price	$149	$325/$379	$995	$499/$599	$599/$699	$449/$499	$495	$495	$445
RAM	512K	512K/1MB	1MB	512K/1MB	512K/1MB	512K/1MB	1MB	1MB	1MB
Video chip	AcuMos	S3	TI 34020	ATI Mach 8	ATI Mach 8	ATI Mach 8	TI 34010	S3	S3
Mouse port	●	○	○	○	●	●	○	○	●
Image quality									
Flicker-free support									
VGA resolution	●	●	n/a	●	●	●	○	●	●
800 by 600 resolution	●	●	n/a	●	●	●	n/a	●	●
1024 by 768 resolution	●	●	○	●	●	●	○	●	●
1280 by 1024 resolution	n/a	○	n/a	[3]	[3]	[3]	n/a	○	●
Colors available with maximum RAM									
Windows									
VGA	256	32,768	n/a	n/a	256	256	256	32,768	32,768
800 by 600	256	256	n/a	n/a	256	256	n/a	256	256
1024 by 768	16	256	256	256	256	256	256	256	256
1280 by 1024	n/a	16	n/a	[3]	[3]	[3]	n/a	16	16
AutoCAD/AutoShade									
VGA	256	32,768	n/a	n/a	256	256	256	32,768	32,768
800 by 600	256	256	n/a	n/a	256	256	n/a	256	256
1024 by 768	16	256	○	256	256	256	256	256	256
1280 by 1024	n/a	16	n/a	[3]	[3]	[3]	n/a	16	16
Ease of installation									
Switchless setup	●	○	●	●	●	●	●	○	●
Menu-driven software driver installation	●	[3]	●	●	●	●	●	○	●
Built-in VGA	●	●	○	○	●	●	○[4]	●	●
Software support									
AutoCAD	●	●	○	●	●	●	●	●	●
1-2-3	●	●	○	○	●	●	○	●	●
WordPerfect	●	●	○	○	●	●	●	●	●
GEM	●	●	○	○	●	●	○	○	●
Service and support									
Warranty	1 year	1 year	5 years	5 years	5 years	5 years	1 year	1½ years	5 years
Money-back guarantee	●	30 days	30 days	○	●	●	via dealer	30 days	30 days
Toll-free tech support	●	●	●	○	●	●	○	●	●
Daily support (hours)	8	9	11	8.5	8.5	8.5	11	13	9.5
Weekend support	●	○	○	○	●	●	○	○	●
BBS/fax	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●
Turnaround policy	5 days	48 hours	24 hours	1–5 days	1–5 days	1–5 days	3 days	5 days	48 hours
	BEST BUY				BEST BUY	BEST BUY			BEST BUY

[1]Estimated street price. [2]Includes mouse. [3]Available too late for review. [4]Extra-cost option. [5]VGA speeds only. [6]Convertible to 90 days free on-site service.

	Enertronics Aurora 1024	Genoa WindowsVGA	Hercules Graphics Station+2	HP Ultra VGA Board	Mylex GL1911 Graphics Adapter	National Design Volante AT800	National Design Volante AT1000	Number Nine #9GXi	Orchid Fahrenheit 1280	STB 1280 Graphics System	STB WIND/X	Vermont Cobra Elite
	$549	$391	$717	$401/$547	$344	$699	$870	$786	$310/$357	$426/$532	$283/$355[2]	$786[2]
	$695	$495	$995	$549/$748	$435	$795	$995	$995	$449/$499	$599/$749	$399/$499	$995
	1MB	1MB	1MB	512K/1MB	1MB	1MB	1MB	1MB	512K/1MB	1MB[3]/2MB	512K/1MB	512K
	TI 34010	S3	TI 34010	S3	S3	TI 34020	TI 34020	TI 34020	S3	C&T 480	S3	TI 34010
	○	○	○	○	○	○	○	○	○	○	●	○
	n/a	●	●	●	●	n/a	●	●	●	●	●	n/a
	n/a	●	●	●	●	●	●	●	●	●	●	○
	○	●	○	●	●	●	●	●	●	●	●	●
	n/a	○	n/a	n/a	n/a	n/a	n/a	●	○	○	○	n/a
	n/a	256/32,768[4]	32,768	256	256	n/a	256	16.7 million	32,768	256[5]	65,536	n/a
	n/a	256	256	256	256	256	256	16.7 million	256	16[5]	256	256
	256	256	256	256	256	256	256	16.7 million	256	256	256	256
	n/a	16	n/a	n/a	n/a	n/a	n/a	16.7 million	16	256[4]	16	n/a
	n/a	256/32,768[4]	32,768	○	256	n/a	256	16.7 million	32,768	256[5]	65,536	n/a
	n/a	256	256	○	256	256	256	16.7 million	256	16[5]	256	16.7 million
	256	256	256	○	256	256	256	16.7 million	256	256	256	16.7 million
	n/a	16	n/a	n/a	n/a	n/a	n/a	16.7 million	16	256[4]	16	n/a
	●	○	●	●	○	○	○	●	○	●	○	●
	●	○	●	○	○	●	●	●	●	●	○	●
	○	●	●	●	●	○	●	●	●	○	●	○
	●	●	●	○	●	●	●	●	●	●	●	●
	○	●	○	○	●	○	○	●	●	●[4]	●	○
	○	●	○	○	●	○	○	●	●	●[4]	●	○
	○	●	○	○	●	○	○	○	●	●[4]	○	○
	2 years	1 year	2½ years	1 year[6]	1 year	lifetime	lifetime	2 years	4 years	2 years	2 years	5 years
	30 days	○	○	○	30 days	30 days	30 days	○	via dealer	○	○	○
	○	○	○	●	●	●	●	●	○	●	●	○
	8	6	10	12	9	9	9	9	10	10	10	9.5
	○	○	○	○	○	○	○	○	○	○	○	○
	●/○	●/○	●/●	●/○	●/○	●/●	●/●	●/●	●/●	●/●	●/●	●/●
	24 hours	2 days	48 hours	3 days	6–10 days	48 hours	48 hours	8–10 days	7–10 days	72 hours	72 hours	24 hours

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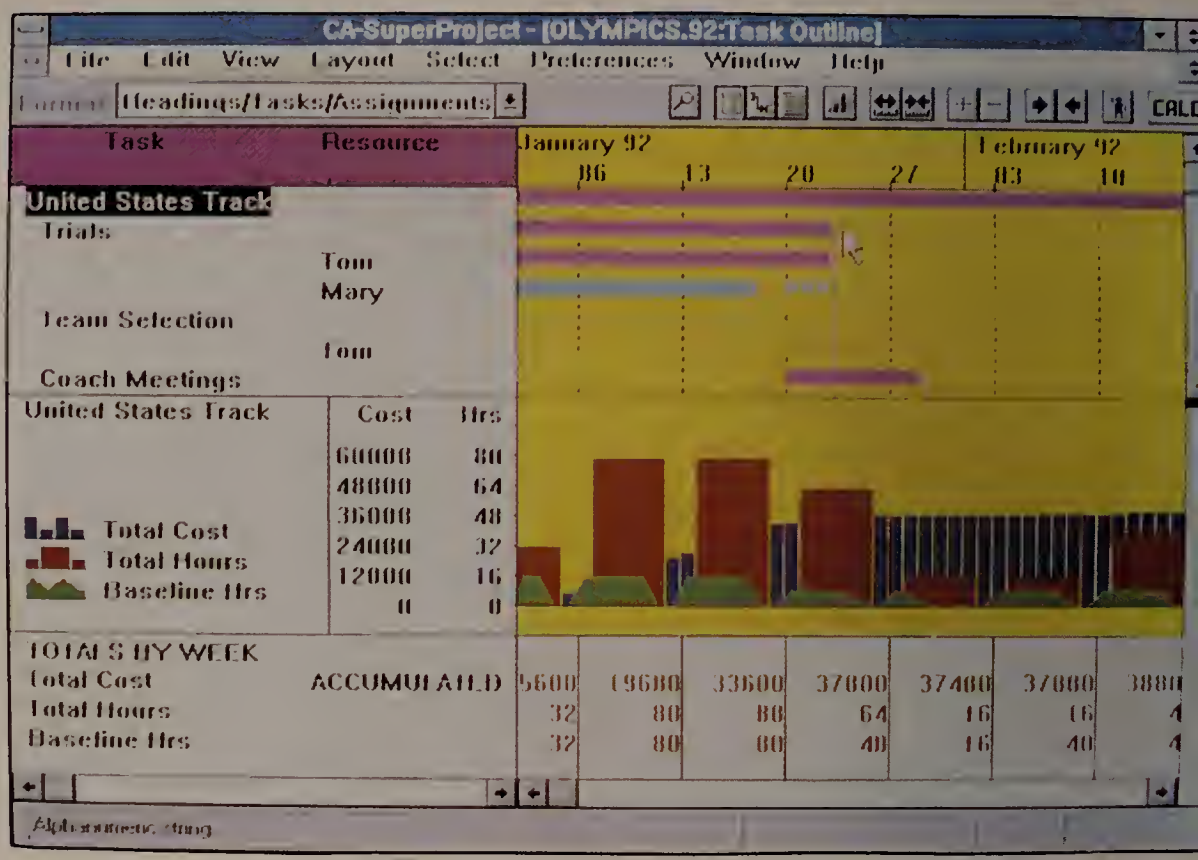

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wer Windows Managers.

A recent study of the five leading project managers proved it. Each was assigned the same project, but the completion dates varied by as much as five months.

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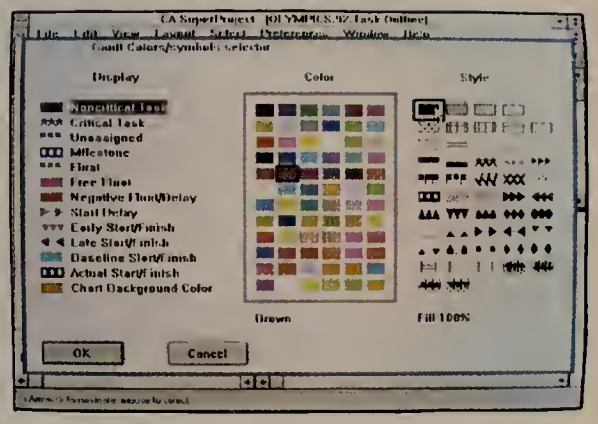
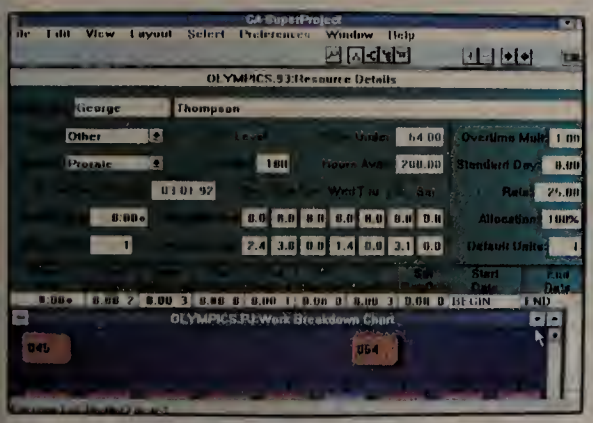
Vibrant, state-of-the-art graphics and detailed reporting tools help bring your projects to life.

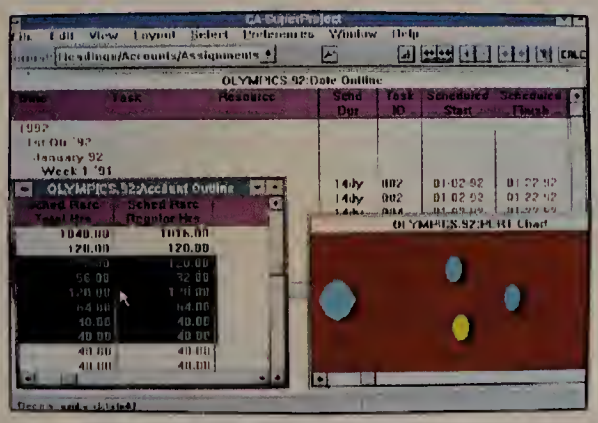
You can choose from WYSIWYG fonts, symbols, colors and shade patterns to highlight your Gantt, PERT, WBS and Cost/Resource charts.



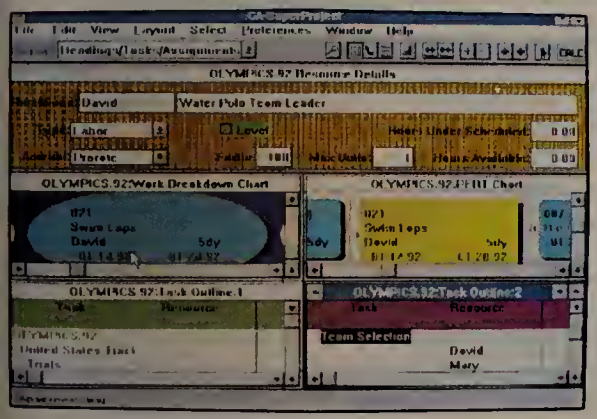
Bring projects to life with a full array of WYSIWYG on-screen interactive graphics, colors, fonts, symbols and shade patterns.



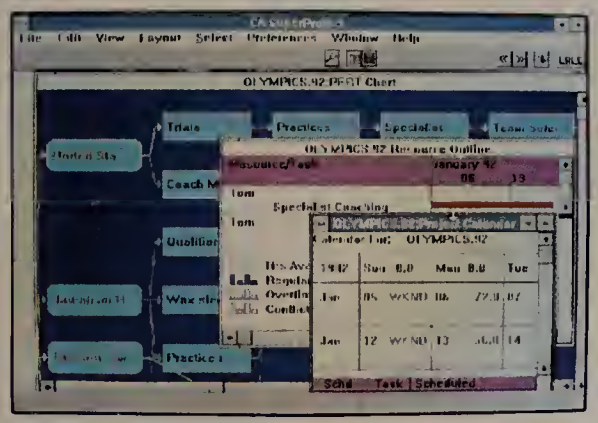
Start by specifying resources, task types and task durations—all in a matter of seconds.



Perform extensive "what-if" analysis, revising schedules as your projects progress.



Show multiple views of the same project or different projects simultaneously.



Report the status of your project with detailed Gantt, PERT, WBS and Cost/Resource charts.

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Circle 26 on reader service card

Speed Up Windows on a Budget

If you can't afford a video board, don't despair. *WinSpeed*, a $79 software program, can quicken *Windows* applications running with a standard super-VGA card.

***WinSpeed* sped a *PowerPoint* slide show more than *any* of the boards here, running it 50 percent faster than super VGA. *Excel* increased by 50 percent, while *Word for Windows* improved by a scant 10 percent. As always, make a reality check with your applications.**

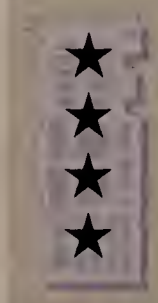
WinSpeed* contains three drivers that display 640 by 480, 800 by 600, and 1024 by 768 *Windows* screens in 256 colors. It works with many super-VGA boards, but if your board is incompatible the company promises to refund your money. —*TJB

WinSpeed $79; Panacea Inc., Post Office Sq. #4, 24 Orchard View Dr., Londonderry, NH 03053-3376; 603/437-5022
Reader service no. 746

ATI Graphics Vantage

The ATI Graphics Vantage is identical to the ATI Graphics Ultra, except it's populated with DRAM instead of the more expensive VRAM. Priced at $373 on the street, it offers an unbeatable combination of low price, easy installation, and good performance, making it a Best Buy.

The Vantage is slower than the Graphics Ultra, but what it loses in speed it makes up in price. *Excel* and *Word for Windows* ran twice as fast as super VGA, and *PowerPoint* slide shows were only 2 percent slower than on the Ultra.



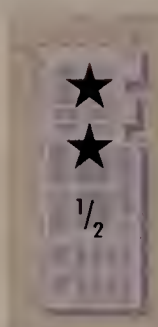
PROCESSOR TYPE: ATI Mach 8
MAXIMUM RESOLUTION: 1024 by 768
WORTH NOTING: Low price, good speed, great fonts
BUILT-IN VGA: Yes

Like the other ATI boards, this one provides flicker-free screens, razor-sharp Crystal fonts, and 13 extra PostScript and LaserJet screen fonts. There are cheaper options, but it would be hard to find a better board for the money.

BCC TIGA-10

With an estimated $391 street price, BCC's TIGA-10 is the cheapest TI 34010 board you can buy, but it's not recommended for users with 14-inch monitors. The board doesn't provide 800 by 600, only 1024 by 768, and most applications are difficult to see on a small monitor at that resolution.

The TIGA-10 improved the speed of *Excel* and *Word for Windows* nearly 2½ times, putting it squarely in the middle of the pack, and it ran *PowerPoint* at about super-VGA speed. However, like many of the S3 boards, it failed to display the text on certain *PowerPoint* screens. And unlike many other products, it doesn't offer 70-Hz flicker-free performance at either 640 by 480 or 1024 by 768 resolutions.



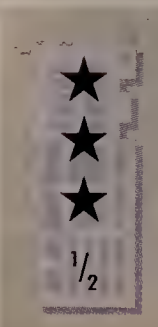
PROCESSOR TYPE: TI34010
MAXIMUM RESOLUTION: 1024 by 768
WORTH NOTING: Low price, flicker
BUILT-IN VGA: No

The TIGA-10's installation is virtually automatic and bulletproof, but technical support calls are on your dime. Although the board offers reasonable performance, you can get nearly as good a package from the $118 Aamazing VGA700.

CSS MaxGraphics/16

CSS MaxGraphics/16's estimated $391 street price is reasonable, its screens are flicker-free up to 1024 by 768, and its performance is quite good. However, it has the dubious distinction of being one of the hardest boards to install. Installation requires setting more than six jumpers, and putting the drivers on the hard disk is a lengthy chore.

The MaxGraphics/16 performs as well as other S3 boards, with *Excel* running more than 2½ times faster than usual, *Word for Windows* 3 times faster, and *PowerPoint* slowing down to almost a third of standard super-VGA speed.



PROCESSOR TYPE: S3
MAXIMUM RESOLUTION: 1280 by 1024
WORTH NOTING: Good support, hard to install
BUILT-IN VGA: Yes

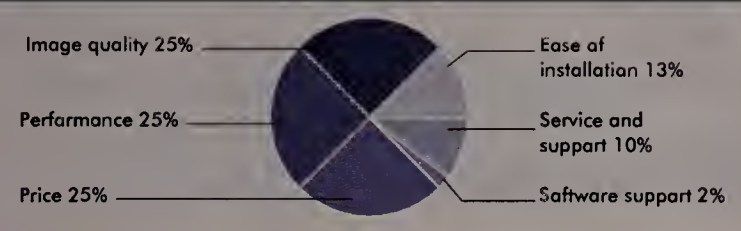
Customer service includes an 18-month warranty and a 30-day money-back guarantee. Technical support is excellent, and the call is toll free. The MaxGraphics/16 is a very good board, but its difficult installation is a major strike against it.

Speedy Boards Lend Wings to Windows

High-resolution Windows displays need plenty of power. With a wide array of configurations and prices to choose from, these 21 boards deliver the goods, thanks to special graphics accelerator chips.

For an absurdly low $118 street price, the Best Buy **Aamazing VGA700** offers impressive Windows performance. The other Best Buys—the **ATI Graphics Ultra** and **Graphics Vantage**, plus the **Diamond Stealth Hicolor**—provide considerably more speed, but you'll have to pay two or three times as much money. All provide flicker-free screens, 256 or more simultaneous colors, easy installation, and superb service and support.

Key Buying Issues: Percentage of Importance



Excellent ★★★★
Good ★★★
Fair ★★
Poor ★

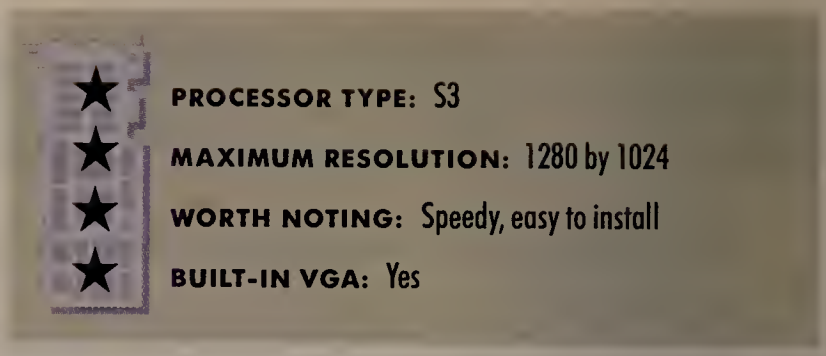
	Reader service number	Image quality	Performance	Price	Ease of installation	Service and support	Software support	Overall value
Aamazing VGA700	716	★★★★	★★★	★★★★	★★★★	★★★½	★★★★	★★★★
Actix Quantum	717	☆☆☆☆	☆☆☆½	☆☆☆☆	☆☆	☆☆☆½	☆☆☆☆	★★★½
Artist Graphics WinSprint 200	718	☆	☆☆☆☆	☆½	☆☆½	☆☆☆½	½	★★½
ATI 8514-Ultra	719	☆☆☆☆	☆☆☆☆	☆☆☆½	☆☆½	☆☆☆½	☆☆☆☆	★★★½
ATI Graphics Ultra	719	★★★★	★★★★	★★★	★★★★	★★★½	★★★★	★★★★
ATI Graphics Vantage	719	★★★★	★★★½	★★★½	★★★★	★★★½	★★★★	★★★★
BCC TIGA-10	720	☆½	☆☆☆½	☆☆☆½	☆☆½	☆☆	☆½	★★½
CSS MaxGraphics/16	721	☆☆☆☆	☆☆☆½	☆☆☆½	☆☆	☆☆☆½	☆☆☆½	★★★½
Diamond Stealth Hicolor	722	★★★★	★★★½	★★★★	★★½	★★★★	★★★½	★★★★
Enertronics Aurora 1024	723	☆	☆☆½	☆☆☆	☆☆½	☆½	☆½	★★
Genoa WindowsVGA	724	☆☆☆☆	☆☆☆½	☆☆☆½	☆☆	☆☆☆½	☆☆☆☆	★★★½
Hercules Graphics Station+2	725	☆☆☆	☆☆☆☆	☆☆	☆☆☆½	☆☆½	☆½	★★★
HP Ultra VGA Board	727	☆☆☆☆	☆☆☆	☆☆☆	☆☆☆½	☆☆☆½	½	★★★½
Mylex GLI911 Graphics Adapter	728	☆☆☆☆	☆☆☆	☆☆☆☆	☆☆	☆☆☆	☆☆☆☆	★★★½
National Design Volante AT800	729	☆☆☆½	☆☆☆☆	☆☆	☆	☆☆☆	☆½	★★★
National Design Volante AT1000	729	☆☆☆☆	☆☆☆☆	☆	☆☆½	☆☆☆	☆½	★★★
Number Nine #9GXi	730	☆☆☆☆	☆☆☆☆	☆½	☆☆☆☆	☆☆☆½	☆½	★★★½
Orchid Fahrenheit 1280	731	☆☆☆☆	☆☆☆½	☆☆☆☆	☆☆½	☆☆☆	☆☆☆☆	★★★½
STB 1280 Graphics System	732	☆☆☆☆	☆☆☆½	☆☆☆½	☆☆½	☆☆☆	☆☆☆½	★★★½
STB WIND/X	732	☆☆☆☆	☆☆☆	☆☆☆☆	☆☆	☆½	☆☆☆½	★★★½
Vermont Cobra Elite	733	☆☆☆	☆½	☆½	☆☆½	☆☆☆☆	☆½	★★½

Overall value is calculated by multiplying each category rating by the category's weight percentage, summing the results, and rounding to the nearest half number.

Diamond Stealth Hicolor

One of the fastest S3 boards in this roundup is Diamond's palm-sized Stealth Hicolor. It's reasonably priced at $355 on the street, and it's one of the easiest boards to install. This combination makes the Stealth Hicolor an unqualified Best Buy.

Thanks to well-written drivers, the Diamond Stealth Hicolor is 10 to 15 percent faster than the average S3 card with *Excel*. *Word for Windows* ran three times faster. Only *PowerPoint* ran slower, about one-third the speed of super VGA. The Stealth Hicolor also supports 32,768 colors at 640 by 480 resolution, and it operates without flicker at all resolutions except for the interlaced 1280 by 1024 mode.

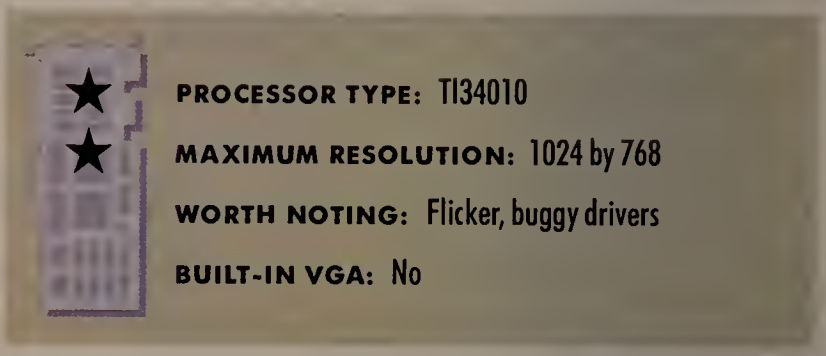


Installation is easy, and the five-year warranty and 30-day money-back guarantee mean you can count on this product. The Stealth Hicolor's speedy performance, moderate price, and good support all contribute to making it a Best Buy.

Enertronics Aurora 1024

The Enertronics Aurora 1024 is moderately priced for a 34010 board ($549 on the street), but it's a finicky board with more than a few hang-ups. It uses a VGA pass-through cable, but some companion VGA cards would not come up in color; it doesn't support 70-Hz refresh; and the drivers are buggy.

The Aurora 1024 is fairly speedy, but only when it wants to be. *Excel* and *Word for Windows* ran more than two times faster, but *PowerPoint* simply refused to run. Fortunately, the card comes with a 30-day money-back guarantee, which gives you time to test it with your applications.

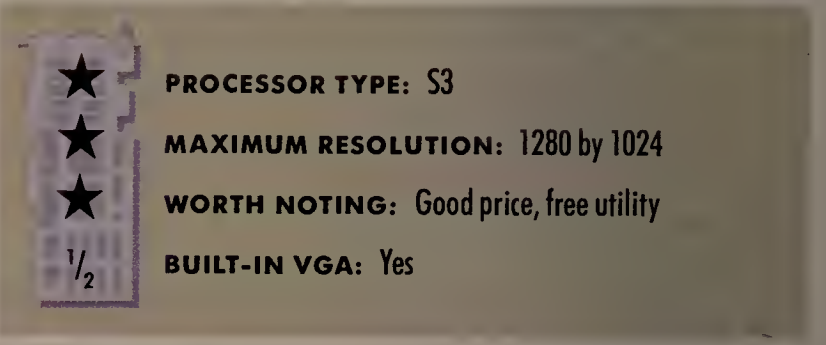


Without a separate VGA board, the Aurora supports only one resolution—1024 by 768—and the flicker can be annoying for some users. Although the Aurora's price is right, its fussiness will make you look elsewhere.

Genoa WindowsVGA

At $391, the Genoa WindowsVGA is a moderately priced board with good amenities. It improved performance better than most other S3 boards, and it operates flicker-free at all resolutions except for the interlaced 1280 by 1024.

For desktop publishing and presentation graphics applications, the WindowsVGA provides 256 colors at up to 1024 by 768 resolution, and 32,768 colors at 640 by 480 when you purchase the $70 color option. If you own a multiscan monitor that lacks adequate sizing controls, you'll appreciate the bundled software utility that enables you to stretch the screen area to the display's edges. Supported DOS applications include *AutoCAD*, *1-2-3*, *WordPerfect*, and *GEM*.

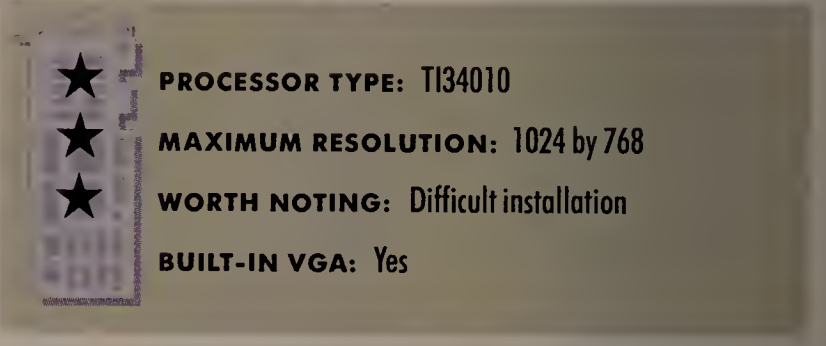


The Genoa's relatively smooth installation, good performance, and reasonable price make it a very good value.

Hercules Graphics Station+2

For $717, the Hercules Graphics Station+2 offers good performance and built-in VGA. Too bad it doesn't go the extra mile with installation. Installing the Hercules with *Windows* requires editing a lengthy setup file, and if you make a mistake you can wreck your existing *Windows* setup.

The Hercules board is moderately speedy. It runs *Excel* and *Word for Windows* about 2½ times faster than super VGA, and it just about keeps pace with VGA on *PowerPoint* graphics. Unlike most TI 34010 boards, the Graphics Station+2 displays 32,786 colors at 640 by 480. However, 1024 by 768 screens don't offer a 70-Hz refresh rate.



For graphic arts designers, the Graphics Station+2 is bundled with Lumena's Art Department professional drawing program for $3395. For other users, the board has all the elements of a good buy, even at its relatively high price, but its difficult *Windows* installation isn't for everyone.

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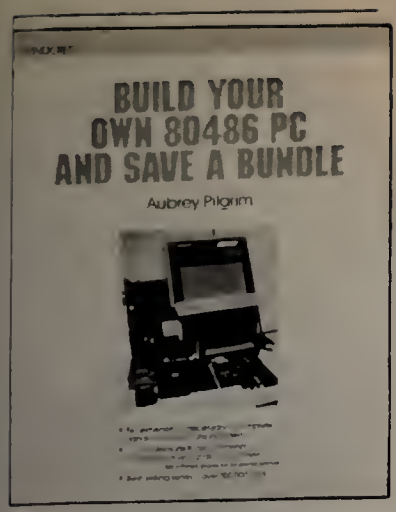
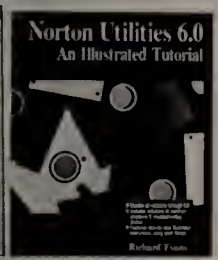


3628 $26.95

3828 $29.95



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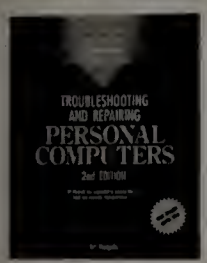

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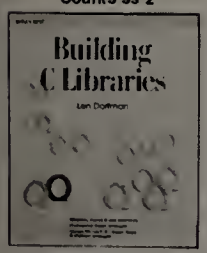

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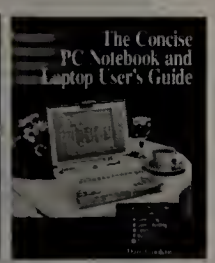
3111P $17.95

3415P $21.95



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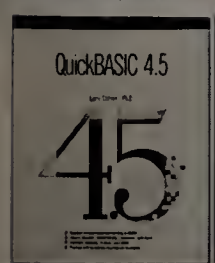
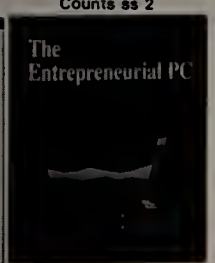


3782P $22.95



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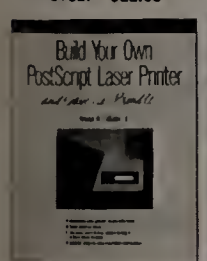

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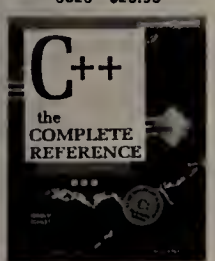

881654-8P $29.95
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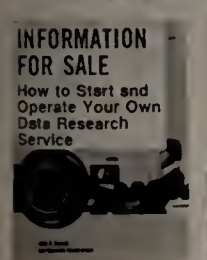
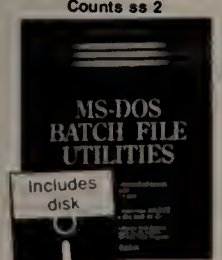
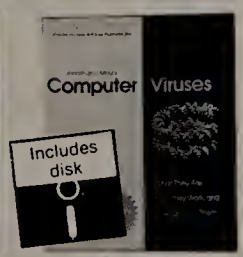


3057P $15.95



3915 $36.95
Counts as 2

3279 $36.95
Counts as 2



3382P $29.95
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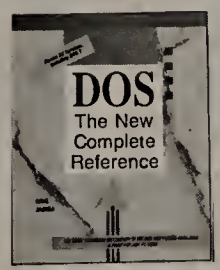
3283P $19.95



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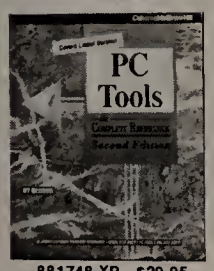

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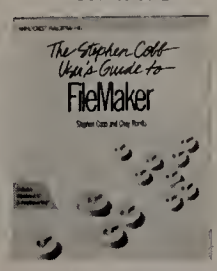
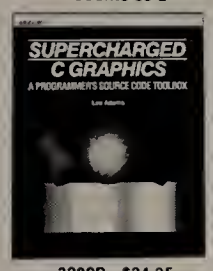


3411P $24.95

3989P $18.95



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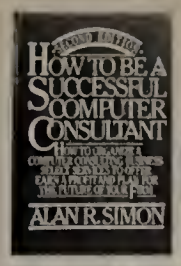

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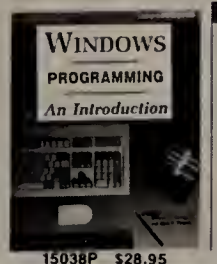

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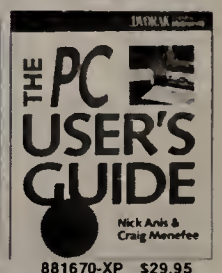

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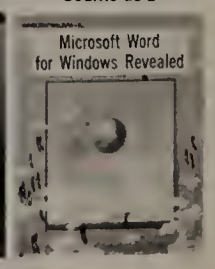
881746-3P $24.95



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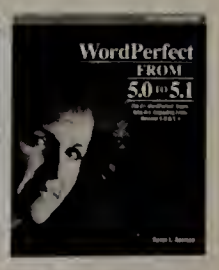
15064P $22.95



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3744 $34.95
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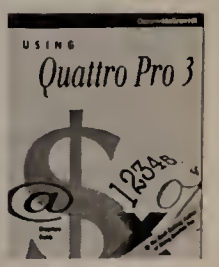

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15057P $39.95
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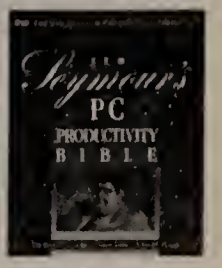

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HP Ultra VGA Board

★★★

PROCESSOR TYPE: S3

MAXIMUM RESOLUTION: 1024 by 768

WORTH NOTING: Costly, easy installation

BUILT-IN VGA: Yes

The Ultra VGA Board is fairly expensive at $547 (estimated street price), but its 90-day on-site service is a nice option and it offers a good combination of features.

The Ultra VGA's speed is average for an S3 card, with *Excel* and *Word for Windows* running more than 2½ times faster, and *PowerPoint* graphics running at about a third the speed of standard super VGA.

Unlike most S3 boards, the board's maximum resolution is 1024 by 768, and it doesn't provide a 32,786 color option. But all of the Ultra VGA Board's resolutions are flicker-free and support 256 colors, and installation is effortless.

The Ultra VGA is expensive for an S3 board, but if you buy it as part of an HP system you can probably cut a good deal. If you want to spend less, shop for other qualified options.

Fast Video Boards: Best of the Rest

The 21 boards in this roundup are just the tip of the iceberg. Here are 16 more that just missed our review deadline, offering even more choices for careful consumers.

				800 by 600 resolution		1024 by 768 resolution			
Model	List price	RAM capacity	Chip	Flicker-free screens	Maximum colors under Windows	Flicker-free screens	Maximum colors under Windows	Warranty	Money-back guarantee
Artist Graphics WinSpeed 100	$395	1MB	C&T 453	Y	256	Y	256	5 years	30 days
Artist Graphics WinSpeed 150	$795	1MB	C&T 480	n/a	n/a	Y	256	5 years	30 days
Boca Research VGA Plus	$149	512K	AcuMos	N	256	N	16	5 years	30 days
DD & TT Enterprise DT911S	$240/$275	512K/1MB	S3	Y	256	Y	256	1 year	none
Desktop AGA 1024 TC	$895	1MB	34010	Y	32,768	Y	32,768	2 years	30 days
Focus 2 the Max VGA S3000	$299	1MB	S3	Y	256	Y	256	2 years	30 days
Hercules Graphics Station Gold 16	$495	3MB	TI34010	Y	256	N	256	2 years	none
Hercules Graphics Station Gold 24	$595	3MB	TI34010	Y	256	Y	256	2 years	none
Hercules Graphics Station MC	$995	2MB	TI34010	Y	256	Y	256	2 years	none
Matrox HiPer VGA	$695	1MB	S3	Y	256	Y	256	2 years	30 days
National MC1000	$995	1MB	TI34020	Y	256	Y	256	Lifetime	30 days
NEC MultiSync Graphics Engine	$999	1MB	TI34010	N	256	Y	256	1 year	none
Quadrant QC-VGA/ACCL	$399	1MB	NCR	Y	32,768	Y	32,768	1 year	none
Video Dynamics Flash VGA	$499	1MB	VDI	Y	256	Y	256	2 years	30 days
Video Dynamics Flash XGA	$649	1MB	VDI	Y	256	Y	256	2 years	30 days
Weitek Power For Windows	$299	512K	Weitek	Y	16	N	16	3 years	30 days

For more information about all products in this table, circle reader service no. 903.

WHERE TO BUY

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800/627-8478,
612/631-8424 (fax)
Reader service no. 734

Boca Research, Inc.
407/997-6227,
407/997-0918 (fax)
Reader service no. 735

DD & TT Enterprise USA Co.
213/780-0099,
714/581-2855
Reader service no. 736

Desktop Computing, Inc.
415/323-5535,
415/323-4434 (fax)
Reader service no. 737

Focus Information Systems Inc.
510/657-2845,
510/657-4158 (fax)
Reader service no. 738

Hercules Computer Technology, Inc.
800/532-0600,
510/540-6621 (fax)
Reader service no. 739

Matrox Electronic Systems
800/ 361-4903,
514/685-2630
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National Design, Inc.
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512/343-5053 (fax)
Reader service no. 741

NEC Technologies Inc.
800/826-2255,
708/860-9500
Reader service no. 742

Quadrant Components Inc.
510/656-9988,
510/656-2208 (fax)
Reader service no. 743

Video Dynamics Inc.
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415/863-3023
Reader service no. 744

Weitek Corp.
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Reader service no. 745

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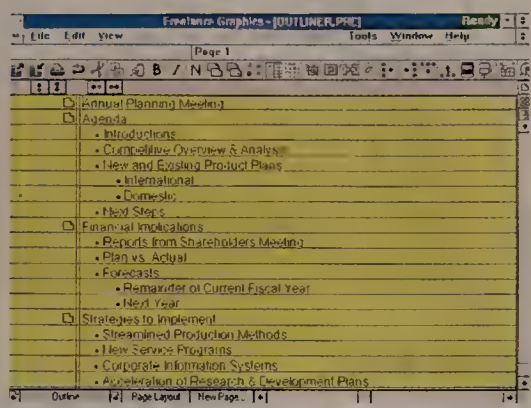

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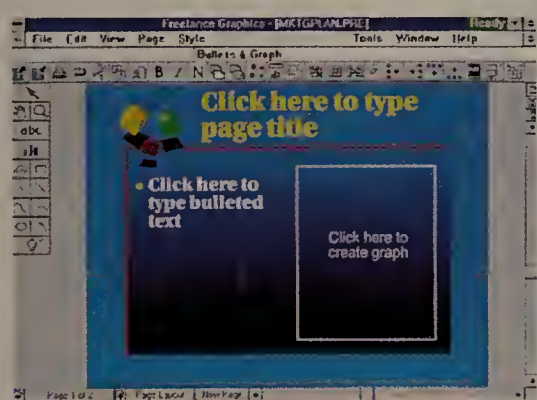

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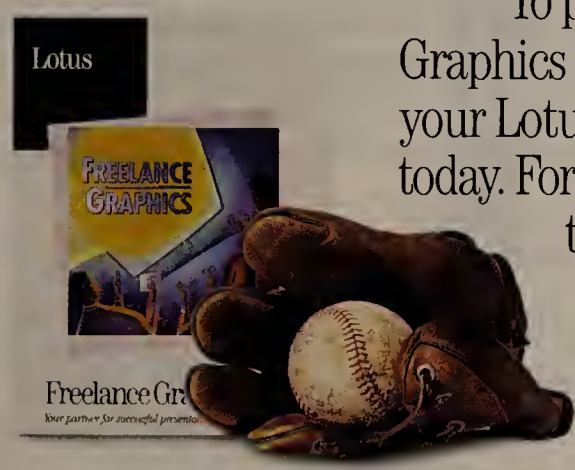

Freelance Graphics for Windows

Lotus

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Mylex GLI911 Graphics Adapter

Offering middle-of-the-pack performance, Mylex's S3-powered GLI911 Graphics Adapter costs a reasonable $344 on the street. This S3 board sped *Excel* by more than 2½ times and improved *Word for Windows* nearly as much. As is usual with S3 boards, *PowerPoint* slowed to approximately one-third the speed of super-VGA.

The GLI911 is flicker free at all supported resolutions. But installing the board means setting numerous jumpers, and driver installation isn't automatic. Unlike some S3 boards, it doesn't support 32,786 colors or 1280 by 1024 resolution.

★ ★ ★ ½

PROCESSOR TYPE: S3
MAXIMUM RESOLUTION: 1024 by 768
WORTH NOTING: Tricky installation, good support
BUILT-IN VGA: Yes

Tech support is fast and accurate, and the board has a 30-day money-back guarantee. The Mylex's combination of low price, excellent image quality, and good support make it a good deal—if you don't mind its tricky installation.

National Design Volante AT800

At $699 on the street, the Volante AT800 isn't cheap, but its features and performance are superb. The AT800 is a stripped-down version of the more expensive Volante AT1000, and its top-gun performance, flicker-free operation, and unusually generous warranty make it an attractive product.

The Volante AT800 was one of the fastest boards reviewed here, with *Excel* running a whopping 4.4 times faster than VGA. *Word for Windows* improved by three times, and even *PowerPoint* ran 10 percent faster. However, the board supports only two resolutions, 800 by 600 and 1024 by 768, unless you hook it to a VGA monitor.

★ ★ ★

PROCESSOR TYPE: TI 34020
MAXIMUM RESOLUTION: 1024 by 768
WORTH NOTING: Speedy, flicker free, costly
BUILT-IN VGA: No

The Volante AT800 comes with a lifetime warranty for both parts and labor—the only one offered by any company in this review—and a 30-day money-back guarantee. It's a very good product, and would have a higher overall rating if not for its relatively high price.

National Design Volante AT1000

For those who demand top-gun performance, National Design serves up the $870 Volante AT1000. Although pricey, it features easy installation, built-in VGA, flicker-free screens with 256 colors at all supported resolutions, and superb speed.

The Volante AT1000 accelerated *Excel, Word for Windows,* and *PowerPoint* as much as the Volante AT800, but it can go much faster. The 1MB board can be upgraded to 4MB of RAM, and it accommodates an optional $400 math coprocesser that lets 3-D graphics run in real time, making the AT1000 ideal for engineering users and future multimedia *Windows* applications, just like the Number Nine board.

★ ★ ★

PROCESSOR TYPE: TI 34020
MAXIMUM RESOLUTION: 1024 by 768
WORTH NOTING: Fast, upgradable, very expensive
BUILT-IN VGA: Yes

The AT1000 offers champion performance, a generous lifetime warranty, and excellent service and support. If you need a top-of-the-line expandable board, this is your product.

Number Nine #9GXi

If it's color you want, Number Nine's #9GXi delivers. It's one of only two boards that offer 16.7 *million* screen colors at 640 by 480 resolution for applications such as photo retouching, and it also provides 256 colors and flicker-free operation at all resolutions, even 1280 by 1024. Toss in good speed and an installation process that's easier than most, and you have a worthwhile product at an estimated $786 street price.

The #9GXi ran *Excel* and *Word for Windows* about 3 times faster, but *PowerPoint* ran only marginally faster than VGA. As with the Volante AT1000, you can add a 34082 floating-point math coprocesser and up to 4MB of VRAM for running 3-D CAD applications in real time.

★ ★ ★ ½

PROCESSOR TYPE: TI 34020
MAXIMUM RESOLUTION: 1280 by 1024
WORTH NOTING: Good color support, upgradability
BUILT-IN VGA: Yes

If you're after speed alone, one of the other boards is a better deal. But if you need superb color support and flicker-free operation at the highest resolutions, the Number Nine is worth the money.

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CODE N3003

Orchid Fahrenheit 1280

★★★½

PROCESSOR TYPE: S3

MAXIMUM RESOLUTION: 1280 by 1024

WORTH NOTING: No flicker, four-year warranty

BUILT-IN VGA: Yes

At a street price of $357, Orchid's Fahrenheit 1280 compares very favorably to other boards, offering flicker-free screens, good performance, and an excellent warranty.

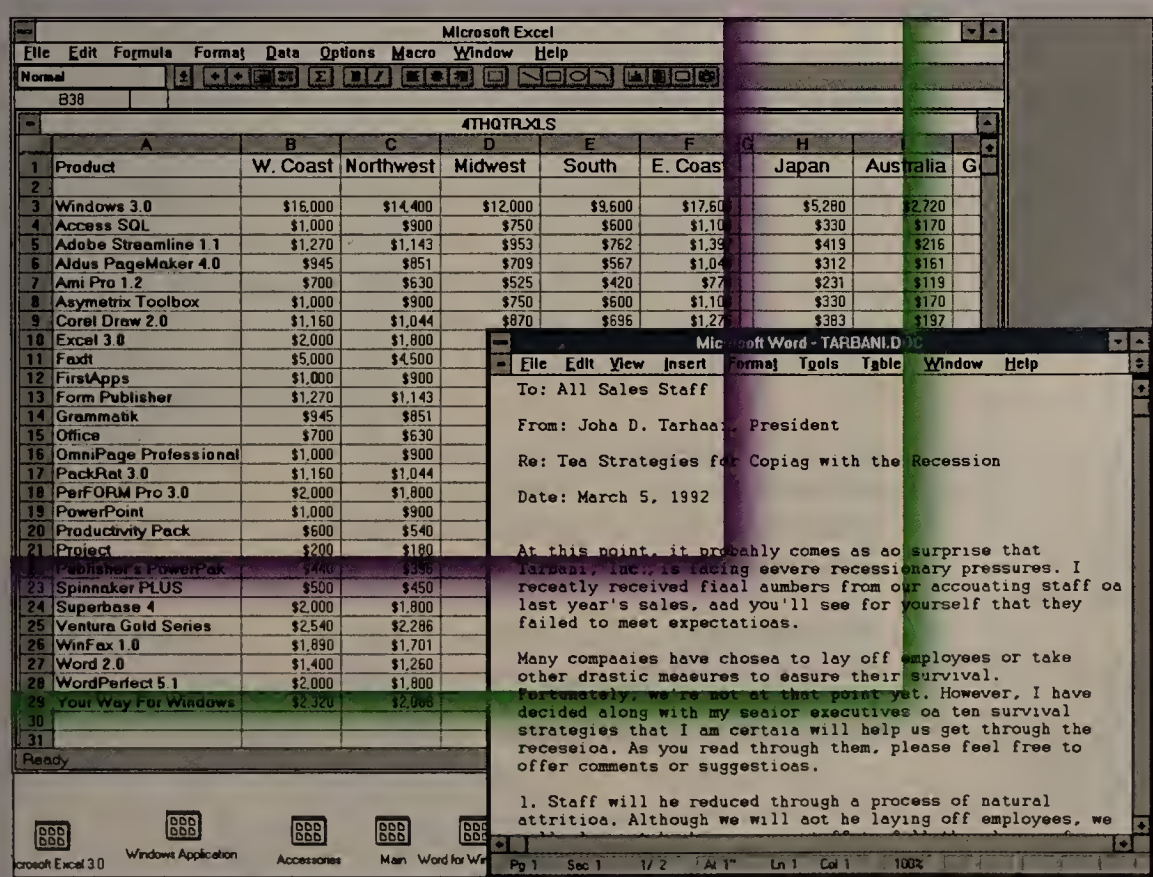
The Fahrenheit 1280 performed about average for an S3 card. It ran *Excel* and *Word for Windows* nearly 3 times faster than super VGA. *PowerPoint* ran at one-third the speed of super VGA, as usual.

The Fahrenheit 1280 operates flicker free except at its interlaced 1280 by 1024 resolution, and you get 32,768 screen colors at no extra cost. The board comes with drivers for numerous DOS programs, too. The warranty lasts four years, and technical support is super, if you don't mind paying for the telephone call. All told, the Fahrenheit 1280's low price and significant perks make it a good deal.

Mix and Match Multiscans

Buying a fast *Windows* display board doesn't mean you have to chuck your old VGA monitor. Almost any VGA display will enjoy speed improvements and provide thousands of colors at 640 by 480 resolution. But if you want to take advantage of other features of your new board, such as support for higher resolutions and flicker-free viewing at 70 Hz or higher, you'll need a multiscan monitor. Using NEC's well-known line of multiscan monitors as examples, the table on the left shows what you get for your money. For more in-depth product coverage, take a look at the Buyers' Guide to Multiscan Monitors in this issue.

Video mode	Refresh rate	Monitor type	List price
640 by 480	60 Hz	any VGA monitor	$300 or less
640 by 480	70 to 72 Hz	NEC 3FGx	$799
800 by 600	56 Hz	NEC 2A	$499
800 by 600	60 Hz	NEC 3FGx	$799
800 by 600	70 to 72 Hz	NEC 3FGx	$799
1024 by 768	60 Hz	NEC 3FGx	$799
1024 by 768	70 Hz	NEC 4FG	$949
1024 by 768	72 Hz	NEC 5FG	$1699
1280 by 1024	60 to 74 Hz	NEC 5FG	$1699



Need extra work space? This Windows screen compares standard 640 by 480 resolution (purple box) with the two super-VGA modes, 800 by 600 (green box) and 1024 by 768. The higher you go, the more you see—as long as your monitor is big enough to display readable fonts.

STB 1280 Graphics System

STB's 1280 Graphics System is a very capable performer, featuring easy installation, flicker-free operation, and good color support at a reasonable cost. Its moderate $426 street price makes it a worthwhile competitor to many of the S3 boards.

Speed improvements were respectable, with *Excel* and *Word for Windows* running more than 2½ times faster. *PowerPoint* graphics poked along at half their super-VGA clip, but that's better than with most S3 boards. The board provides 15 drivers, although only *Windows* and *AutoCAD* are accelerated; the other applications run at super-VGA speeds.

★★★½

PROCESSOR TYPE: Chips & Technologies 480
MAXIMUM RESOLUTION: 1280 by 1024
WORTH NOTING: Quick installation, reasonable price
BUILT-IN VGA: No

The 1280 Graphics System is one of two boards that display 256 colors at 1280 by 1024, if you invest $125 in the extra 1MB of RAM. Installation is both switchless and menu driven, making this a good value for *Windows* and *AutoCAD* users.

STB WIND/X

STB's S3-powered WIND/X board is cheaper than the 1280 Graphics System. For just $355 (estimated street price) you get 65,536 screen colors at 640 by 480, 11 software drivers, and a mouse. If you don't mind fidgeting with tiny jumpers, this is a very good product.

The WIND/X showed no speed surprises, chugging right along with the rest of the S3 boards. Expect 2 to 2½ times the speed for *Excel* and *Word for Windows* and one-third the speed for *PowerPoint* graphics compared to super VGA.

STB's WIND/X provides flicker-free operation at all resolutions except its interlaced 1280 by 1024 mode. It's a good performer that's loaded with nice extras. Were it not for the myriad tiny jumpers, it would merit a Best Buy. But the WIND/X is still a very good deal.

★★★½

PROCESSOR TYPE: S3
MAXIMUM RESOLUTION: 1280 by 1024
WORTH NOTING: Many drivers, hard to install
BUILT-IN VGA: Yes

Vermont Cobra Elite

Despite being powered by a TI 34010 video coprocessor, Vermont's Cobra Elite is one of the slowest boards in the review. It also carries a high $786 estimated street price and requires a companion VGA card to display 640 by 480 resolution, making it only a fair value.

The Cobra Elite boosted *Word for Windows* by only about 40 percent, while *Excel* ran marginally faster than under super VGA and *PowerPoint* ran about 15 percent slower. Moreover, the board provides a narrow range of drivers: It supports only *Windows* and CAD applications.

At 1024 by 768 resolution, screens are flicker free, but the low 56-Hz refresh rate at 800 by 600 makes them vibrate badly. Despite the confidence-boosting five-year warranty, the Vermont Cobra Elite's high price, mediocre *Windows* performance, flicker, and unorthodox installation process make it less appealing than many others.

★★½

PROCESSOR TYPE: TI 34010
MAXIMUM RESOLUTION: 1024 by 768
WORTH NOTING: Expensive, slow, few drivers
BUILT-IN VGA: No

WHERE TO BUY

Aamazing VGA700
Aamazing Technologies
1050 W. Beacon St.
Brea, CA 92621
714/255-1688,
718/667-8730
LIST PRICE: $149 with 512K RAM
Reader service no. 716

Actix Quantum
Actix Systems, Inc.
4633 Old Ironsides Dr. #310
Santa Clara, CA 95054
408/986-1625,
408/986-1646 (fax)
LIST PRICE: $325 with 512K RAM; $379 with 1MB
Reader service no. 717

Artist Graphics WinSprint 200
Artist Graphics
2675 Patton Rd.
St. Paul, MN 55113
800/627-8478,
612/631-8424 (fax)
LIST PRICE: $995 with 1MB RAM
Reader service no. 718

ATI 8514-Ultra
ATI Graphics Ultra
ATI Graphics Vantage
ATI Technologies, Inc.
3761 Victoria Park Ave.
Scarborough, Ontario, Canada M1W 3S2
416/756-0718,
416/756-0720 (fax)
LIST PRICE: 8514-Ultra with 512K RAM $499, with 1MB $599; Graphics Ultra with 512K RAM $599, with 1MB $699; Graphics Vantage with 512K $449, with 1MB $499
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BCC TIGA-10
BCC
174 Component Dr.
San Jose, CA 95131
800/827-4222,
408/944-9001 (fax)
LIST PRICE: $495 with 1MB VRAM AND 512K RAM
Reader service no. 720

CSS MaxGraphics/16
CSS Laboratories
1641 McGaw Ave.
Irvine, CA 92714
800/966-2771,

714/852-9464 (fax)
LIST PRICE: $495 with 1MB RAM
Reader service no. 721

Diamond Stealth Hicolor
Diamond Computer Systems, Inc.
532 Mercury Dr.
Sunnyvale, CA 94086
408/736-2000,
408/730-5750 (fax)
LIST PRICE: $445 with 1MB RAM
Reader service no. 722

Enertronics Aurora 1024
Enertronics Research
1801 Beltway Dr.
St. Louis, MO 63114
800/325-0174,
314/427-7522 (fax)
LIST PRICE: $695 with 1MB RAM
Reader service no. 723

Genoa WindowsVGA
Genoa Systems
75 E. Trimble Rd.
San Jose, CA 95131
408/432-9090,
408/434-0997 (fax)
LIST PRICE: $495 with 1MB RAM
Reader service no. 724

Hercules Graphics Station+2
Hercules Computer Technology, Inc.
921 Parker St.
Berkeley, CA 94710
800/532-0600,
510/540-6621 (fax)
LIST PRICE: $995 with 1MB VRAM, 2MB DRAM
Reader service no. 725

HP Ultra VGA Board
Hewlett-Packard Co.
19310 Pruneridge Ave.
Cupertino, CA 95014
800/752-0900
LIST PRICE: $549 with 512K, $748 with 1MB RAM
Reader service no. 727

Mylex GLI911 Graphics Controller
Mylex Corp.
34551 Ardenwood Blvd.
Fremont, CA
510/796-6100,
510/745-8016 (fax)
LIST PRICE: $392 with 1MB RAM
Reader service no. 728

National Design Volante AT800
National Design Volante AT1000
National Design, Inc.
9171 Capital of Texas Hwy. N, Ste. H230
Austin, TX 78759
800/253-8831,
512/343-5053 (fax)
LIST PRICE: AT800 $795 with 1MB RAM; AT1000 $995 with 1MB RAM
Reader service no. 729

Number Nine #9GXi
Number Nine Computer Corp.
18 Hartwell Ave.
Lexington, MA 02173
800/438-6463,
617/674-2919 (fax)
LIST PRICE: $995 with 1MB RAM
Reader service no. 730

Orchid Fahrenheit 1280
Orchid Technology
45365 Northport Loop W
Fremont, CA 94538
800/767-2443,
510/490-9312 (fax)
LIST PRICE: $449 with1MB RAM
Reader service no. 731

STB 1280 Graphics System
STB WIND/X
STB Systems, Inc.
1651 N. Glenville #210
Richardson, TX 75081
800/234-4334,
214/234-1306 (fax)
LIST PRICE: 1280 Graphics System $599 with 1MB RAM, $749 with 2MB RAM; WIND/X $399 with 512K RAM, $499 with 1MB RAM
Reader service no. 732

Vermont Cobra Elite
Vermont Microsystems
11 Tigan St.
Winooski, VT 05404
802/655-2860,
802/655-9058 (fax)
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⊡Adobe TypeSets for Business..... ea. 95.
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6590 ⊡Adobe Streamline 3.0 for Windows ... 125.
7928 ⊡Adobe Plus Pack 1.0..... 129.
8367 ⊡ATM & Plus Pack Bundle..... 169.
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Alpha Software ... NCP
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Application Techniques ... NCP
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Artisoft ... NCP
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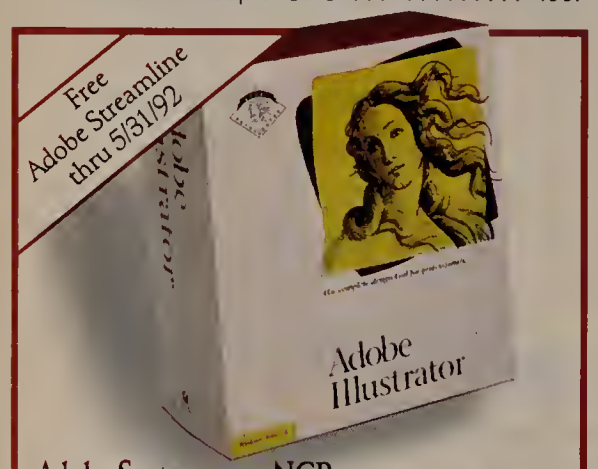
2452 EtherNet Adapter Card..... 199.



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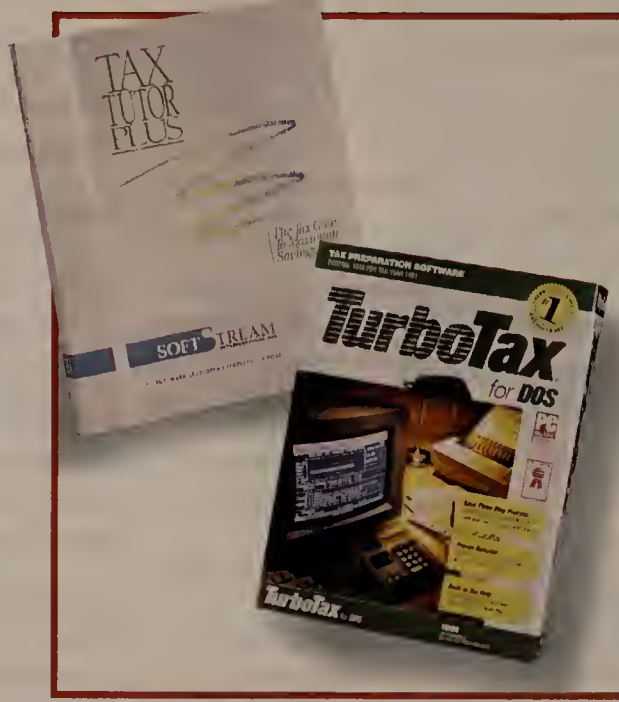

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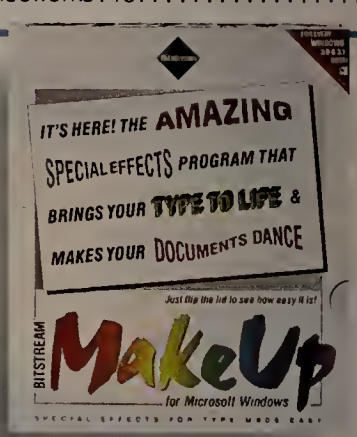

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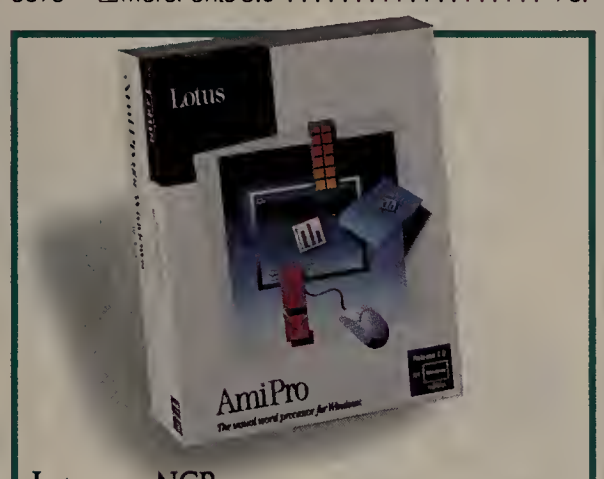

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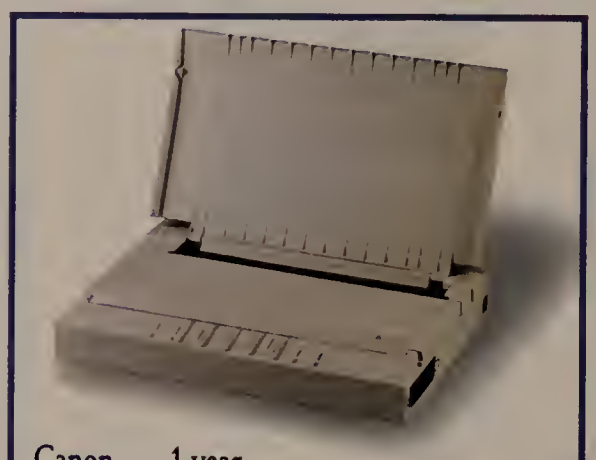
Software Ventures ... NCP
6889 ☒ MicroPhone II 2.0 ..... 99.
Spinnaker ... NCP
1415 ☒ PFS: WindowWorks 1.0 ..... 129.
Stac Electronics ... NCP
1409 ☒ Stacker 2.0 ..... 89.
3524 ☒ Stacker 2.0 w/16-bit Coprocessor Card 195.
Symantec ... NCP
6397 ☐ The Norton Backup 1.2 *(Windows/DOS)* 89.
3146 ☐ The Norton Utilities 6.0 ..... 119.
3425 ☐ Q&A 4.0 ..... 269.
7999 ☐ Norton Anti-Virus 1.5 ..... 89.
2359 ☐ The Norton Desktop 1.0 for Windows .. 99.
8378 ☐ PC Anywhere IV 4.5 ..... 125.
4688 ☐ Zortech C++ 3.0 ..... 479.
Systems Compatibility ... NCP
9046 ☐ Complete Writer's Toolkit 1.1 *(DOS)* ... 85.
3949 ☐ Complete Writer's Toolkit 1.0 for Windows 85.
Teleware ... NCP
9847 ☒ M.Y.O.B. for Windows ..... 139.
TIMESLIPS ... NCP
6994 ☐ PercentEdge 1.0 ..... 69.
2987 ☐ Timeslips III 4.0 ..... 195.
5037 ☐ TimeSheet Pro for Windows ..... 135.
Timeworks ... NCP
6253 ☒ Publish-It! 2.0 ..... 159.
Tool Technology ... NCP
3863 WinTools for Windows 1.0 *(3½" only)* ... 125.
Touchstone Software ... NCP
7420 ☒ Check It 3.0 ..... 89.
Traveling Software ... NCP
4407 ☒ LapLink Pro 4.0 ..... 95.

TIMESLIPS ... NCP
5037 ☐ *TimeSheet Professional for Windows*–Windows version now available! Track time & expenses for projects & clients. Unique electronic spreadsheet design provides a week-at-a-glance view of all your projects & tasks **$135.**

WordPerfect Corporation ... NCP
7781 ☒ LetterPerfect 1.0 ..... $135.
4214 ☒ WordPerfect Office PC ..... 89.
3804 ☐ WordPerfect 5.1 ..... 269.
3494 ☐ WordPerfect 5.1 for Windows ..... 279.
3806 ☐ WordPerfect 5.1 Additional User ..... 199.
WordStar International ... NCP
1482 ☒ Correct Grammar 1.0 for Windows .... 65.
3442 ☒ WordStar 1.0 for Windows ..... 279.
XTREE ... NCP
6161 ☒ XTree Gold 2.5 ..... 99.

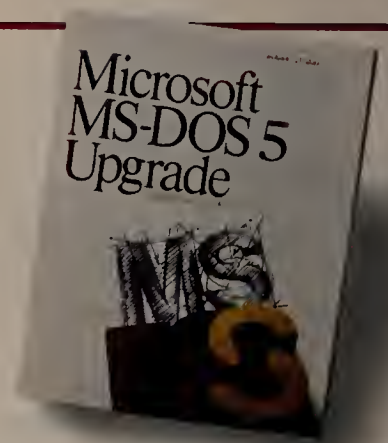
RECREATIONAL/EDUCATIONAL

Abracadata ... NCP
3641 ☒ Design Your Own Railroad ..... 39.
3629 ☒ Design Your Own Home-Architecture 3.0 63.
3631 ☒ Design Your Own Home-Interiors 1.0 .. 63.
Broderbund ... CP
8068 ☒ Where in World is Carmen Deluxe. .... 52.
1836 ☒ Where in America's Past is Carmen ... 39.
5851 ☒ SimCity from Maxis. ..... 33.
4388 ☐ SimAnt from Maxis ..... 39.
4411 ☒ SimEarth for Windows from Maxis .... 45.
Davidson & Assoc. ... NCP
3947 ☒ Math Blaster Plus ..... 29.
4183 ☒ KidWorks ..... 29.



Canon ... 1 year
7894 *BJ-10ex Printer*–New enhanced version of the popular 4.6 lb. printer provides laser-like print quality (up to 360 dpi) on plain bond paper, envelopes or transparencies. Available in white or gray ..... **$339.**

Electronic Arts ... NCP
4534 ☒ Mavis Beacon Teaches Typing 2.0 *(CP)* 35.
3031 ☒ Mavis Beacon for Windows. ..... 45.
3023 ☒ ChessMaster 3000 ..... 35.
Harvard Associates ... NCP
2324 ☒ PC Logo 3.0 ..... 59.
HyperGlot Software ... NCP
(French, German, Italian, Spanish available.)
☐ Word Torture for Windows ..... ea. 34.
☐ Word Torture 3.0 ..... ea. 29.
Knowledge Adventure ... NCP
3861 ☐ Knowledge Adventure 1.0 ..... 65.
Microsoft ... NCP
7881 ☐ Entertainment Pack for Windows 1.0 .. 29.
2858 ☐ Flight Simulator 4.0. ..... 39.
Penton Overseas ... NCP
☒ VocabuLearn/ce Levels I & II (French, Italian, German, Spanish, Russian, Hebrew and Japanese). ..... ea. 35.
Personal Training Systems ... NCP
Training tutorials - beg. to adv. for Windows, Excel, PageMaker, & Lotus 1-2-3 *(3½")* ea. 65.
Sierra ... CP
9466 ☐ Space Quest IV *(VGA)*. ..... 45.
3193 ☐ Police Quest III *VGA)*. ..... 45.
Software Toolworks ... NCP
3294 ☒ Game Pak *(5 games in one)* ..... 32.
5032 Miracle *(piano teacher) (incl. kybd.)* .... 359.
Spectrum Holobyte ... NCP
4834 ☒ Super Tetris. ..... 32.
4833 ☒ Super Tetris for Windows. ..... 32.



Microsoft ... NCP
1620 ☐ *MS-DOS 5 Upgrade*–Improved graphical shell, on-line help, task swapping, full screen editor, & more are all awaiting you w/MS-DOS 5 Upgrade. Upgrade your current DOS with ease to MS-DOS 5 Upgrade for only ... **$65.**

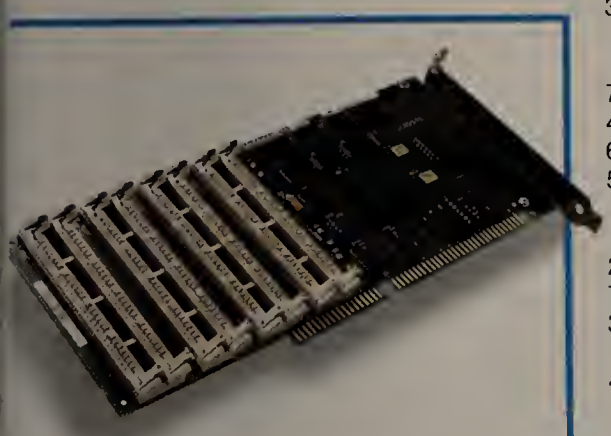
Toyogo ... NCP
2703 ☒ Nemesis Deluxe Toolkit 5.0 ..... 75.
2704 ☒ Nemesis Deluxe Toolkit 5.0 for Windows 75.
True BASIC, Inc. ... NCP
☒ Kemeny/Kurtz Math Series ..... ea. 45.
Walt Disney Computer Software ... CP
2629 ☒ Mickey's 123's ..... 35.
2624 ☒ Mickey's ABC's ..... 35.
4398 ☒ The Animation Studio ..... 79.

HARDWARE

Warranties listed next to manufacturer.

American Power ... 2 years
7108 Smart UPS 400 ..... 339.
7105 Smart UPS 600 ..... 469.
3858 Back-UPS 400 ..... 185.
3823 Back-UPS 600 ..... 299.
ATI Technologies ... 2 years
9821 VGA Basic-16 *(640 x 480, 16 colors)*. .... 69.
2706 VGA Wonder XL *(with 1 MB)*. ..... 199.
2382 Graphics Vantage VGA *(with 1 MB)* .... 359.
9822 Ultra *(with 1 MB) (requires VGA)* ..... 419.
2012 Graphics Ultra with VGA *(with 1 MB)*. ... 479.
1825 2400etc/i Modem *(with 9600 SendFax)* . 139.
9620 9600etc/e Modem ..... 379.
3902 Stereo•F/X ..... 149.
3900 VGA Stereo•F/X *(w/512K, upgrd. to 1 MB)* 329.
Boca Research ... 5 years
7150 BOCARAM/AT PLUS *(2 MB)*. ..... 219.
7139 *(4 MB)* .... 329. 7138 *(8 MB)* .... 539.
6998 I/O Board for AT ..... 55.
6999 I/O Board for Microchannel *(S/S/P)*. .... 109.
8380 BasicVGA *(256K, 640 x 480)* ..... 63.
8381 SuperVGA *(1 MB, 1024 x 768)* ..... 145.
3859 2400 Internal Modem. ..... 85.
3860 2400 External Modem ..... 109.
Bravo Communications ... 2 years
7400 2 Position Laser Compatible Switch Box. 109.
Brown-Wagh ... 1 year
8578 Creative Labs Sound Blaster. ..... 115.
2336 Creative Labs Sound Blaster Pro ..... 189.
Caere ... 1 year
8158 Typist Plus Graphics. ..... 389.
Canon ... 1 year
We are an authorized Canon Service Center.
7894 BJ-10ex Printer *(4.6 lb.)* ..... 339.
7897 BubbleJet Ink Cartridge *(BJ-10ex)* ..... 23.
7896 BJ-10ex Sheet Feeder ..... 75.
Cardinal ... 1 year
2720 MB2450 Internal 2400 Baud Modem. ... 59.
2719 MB2296SR Internal Send/Receive Fax. . 105.
2721 VGA732 True Color Ultra VGA Card .... 185.
4124 VGA742 True Color Ultra VGA Card .... 199.
CH Products ... 1 year
7935 Game Card III Auto .. 33. 7341 MCA .. 49.
7801 FlightStick with Falcon ..... 49.

don't you deserve us?



Intel ... 5 years
1086 *Matched Memory Classic Memory Board ØK*–Great performance with a great price to match. EMS 4.0 compatibility built in to the hardware for up to 90% faster processing. Expandable to 8 MB using 1 MB SIMMs ..... $139.

Colorado Memory Systems ... 1 year
194 Jumbo 120 Tape Backup ..... 209.
354 Jumbo 250 Tape Backup ..... 269.

Curtis ... lifetime
708 Ruby-Plus SPF-2+ ..... 65.
358 Command Center SPF-4 ..... 89.
Glass Filter Plus *(specify size)* ..... ea. 65.

Cyrix Corporation ... 5 years
MATH COPROCESSORS
875 FasMath 83D87-25 ..... 185.
876 FasMath 83D87-33 ..... 195.
877 FasMath 83S87-16 *(SX compatible)* .... 115.

Datadesk ... 3 years
901 Switchboard *(modular keyboard)* ..... 159.

Epson ... 2 years
We are an authorized Epson Service Center.
1906 FX-850 *(80 col., 264 cps, 9 pin)* ..... 319.
1904 FX-1050 *(136 col., 264 cps, 9 pin)* ..... 449.
2358 LQ-570 *(80 col., 252 cps)* ..... 289.
2361 LQ-870 *(80 col., 330 cps)* ..... 489.
2357 LQ-1170 *(136 col., 330 cps)* ..... 669.
5184 LX-810 *(80 col., 180 cps, 9 pin)* ..... 185.

Everex ... 1 year
1683 Tempo LX Notebook *(5 MB, 60 MB HD)* call

Hauppauge Computer ... 1 year
9870 25 MHz 386N Motherboard for AT ..... 899.
9034 33 MHz 386N Motherboard for AT ..... 979.

Hayes ... 2 years
7391 ULTRA 96 Modem ..... 669.
5024 ULTRA 144 Modem ..... 799.
3522 OPTIMA 96 Modem ..... 479.
9884 Pocket Edition 2400 ..... 119.

Hewlett-Packard ... 1 year
3957 LaserJet IIP Plus *(with toner)* ..... 879.
9993 LaserJet IIIP *(with toner)* ..... 1099.
6754 LaserJet III *(with toner)* ..... 1599.

Intel ... 5 years
3864 14.4EX Modem ..... 549.
6421 2400B MNP Internal Modem ..... 189.
6420 2400EX MNP Modem ..... 225.
7880 9600EX Modem ..... 469.
5336 Above Board Plus 8 2 MB ..... 449.
5342 Above Board Plus 8 I/O 2 MB ..... 479.
1086 Matched Memory Classic Memory Brd. ØK 139.
7782 SatisFAXtion *(fax board)* ..... 389.
8903 Matched Memory 4 MB *(PS/2)* ..... 239.
Matched Memory *(for LaserJet IIP, III, IIIP IIID)*
1810 1 MB ..... 79. 1787 2 MB ..... 149.
Matched Memory *(for Compaq LTE 386S/20)*
5102 1 MB ..... 189. 5103 4 MB ..... 529.
3076 Snap-In 386 *(for PS/2 50/60)* ..... 389.
3358 Power Pak *(Snap-In 386 & Above Board Microchannel 4 MB)* ..... $925.
MATH COPROCESSORS
7385 80287XL *(16 MHz 80286 CPU's)* ..... 89.
4750 80387SX *(16 MHz 80386SX CPU's)* .... 129.
6830 80387SX-20 *(20 MHz 80386SX CPU's)* . 145.
5409 80387-33 *(80386DX CPU's)* ..... 219.

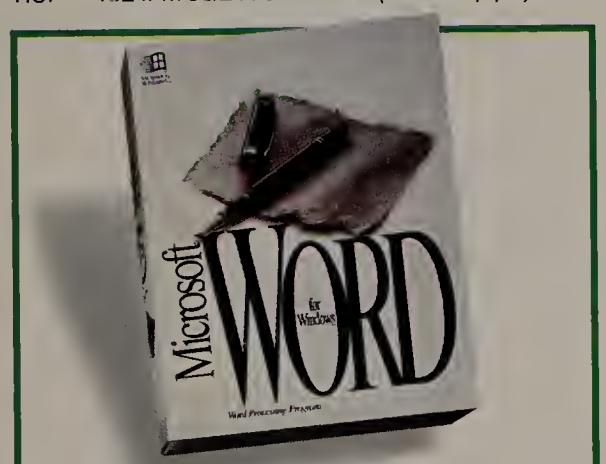
Kensington Microware ... 1 year
Full line available. Partial listing.
2582 Master Piece Plus ..... 99.
7899 Expert Mouse *serial* . 119. 7900 *bus* . 129.
3311 MasterStand ..... 59.

Keytronic ... 3 years
4518 101 Plus Keyboard ..... 99.

Kraft ... 5 years
5801 Game Card *(2 ports)* ..... 27.
5813 Game Card with Thunderstick ..... 49.
5800 3 button Thunder Joystick ..... 29.

Logitech ... limited lifetime
6029 Trackman *serial* .... 69. 6028 *bus* .... 72.
2343 Trackman Portable ..... 105.
7975 ScanMan 256 ..... 289.
3295 MouseMan *(combo)* 75. 9766 *(cordless)* 89.

Megahertz ... 5 years
3020 T224FM 96/24 Pocket Fax Modem .... 249.
1187 T324FM 96/24 Fax Modem *(Toshiba Lptps.)* 269.



Microsoft ... NCP
6195 ▣ *Word 2.0 for Windows*–Everyday tasks are easy with the customizable toolbar, drag & drop movement of text, & instant character & page formatting from the Ribbon & Ruler. Includes drawing, charting & WordArt . $329.

Micron Technology ... 2 years
7595 2 MB Expansion for HP LaserJet IIP or III 119.

Microsoft ... lifetime
7597 Microsoft Mouse *(bus or serial)* ..... 89.
2897 Mouse with Paintbrush *(bus or serial)* ... 105.
2898 Mouse with Windows 3.0 *(bus or serial)* . 149.
1896 Ballpoint Mouse *(serial only)* ..... 119.

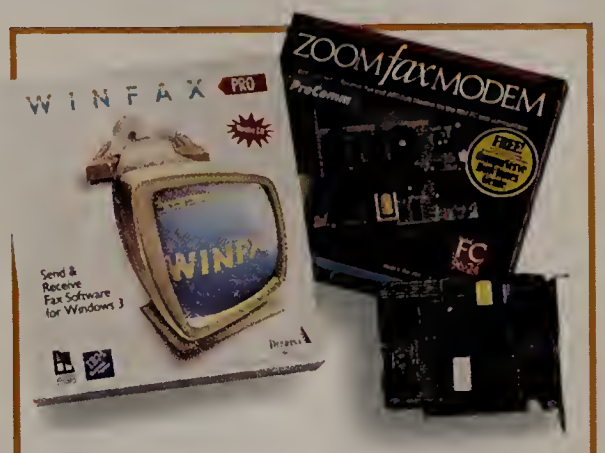
MicroSpeed ... 1 year
2763 MicroTRAC *(serial & PS/2 interface)* ..... 59.
PC-TRAC Trackball
6007 *serial* ..... 75. 6008 *bus* ..... 89.
7271 *Inport* ..... 79. 6330 *PS/2* ..... 79.

Mouse Systems ... lifetime
5997 Trackball *(1 yr. wrnty.) serial* .. 65. *bus* .. 69.
3213 PC Trackball II *(serial)* ..... 69.
7878 PC Mouse III *(serial)* .... 89. *(bus)* .... 95.

1-800/800-0003

MMC

PC Connection 940W
6 Mill Street
Marlow, NH 03456
SALES 603/446-7721 **FAX** 603/446-7791



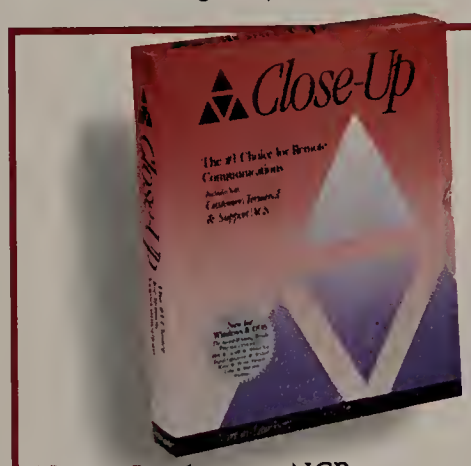
Zoom Telephonics/Delrina Technology
Zoom 24/96 Fax Modem/Delrina Winfax Pro Bundle–Get this great 9600 bps send/receive fax with 2400 baud modem along with Delrina's Winfax Pro at a special price. Offer good thru 3/31/92. 4400 *Int. Bundle* $155. 4401 *Ext. Bundle* $159.

NEC ... 2 years
2478 CD Gallery with CDR36 for PC ..... 579.
4252 Multisync 3FGX Monitor *(14")* ..... 679.
4249 Multisync 4FG Monitor *(15")* ..... 779.

Okidata ... 1 year
5093 OL400 Page Printer *(4 ppm)* ..... 649.
5094 OL830 Page Printer *(8 ppm)* ..... 1329.
3025 Toner Cartridge ..... 25.

Orchid Technology ... 4 years
7863 ProDesigner VGA IIS *(with 1 MB, includes RAMDAC chip)* ..... 249.
4071 1280i with 1 MB ..... 365.

Pacific Data ... lifetime/60 day MBG
6779 25 Cartridges in One! *(LJ II, IID, IIP, III, IIID)* 269.
Fontbank *(for LJ II, IID, IIP, III, IIID, IIIIP)*
2255 *(0.75 MB)* ... 225. 3491 *(1.5 MB)* ... 299.
8975 Complete Font Library *(LJ III, IIID, IIIP)* .. 265.
Memory upgrade for LJ IIP, III, IIID, IIIP:
7055 *2 MB* ..... 139. 7759 *4 MB* ..... 259.
Memory upgrade for LaserJet II/IID:
6838 *2 MB* ..... 249. 6836 *4 MB* ..... 369.
8090 Pacific Connect with 1.25 MB ..... 349.
7158 Pacific Page PE *(LJ IID, IIP, III, IIID, IIIP)* . 369.
6834 Pacific Page *(for LJ II)* w/2 MB Mem. Brd. 369.
9833 Pacific Page XL *(w/accelerator board)* .. 779.



Norton-Lambert ... NCP
2753 □ *Close-Up for Windows & DOS Dual Pack 4.0*–Winner of *PC Magazine*'s "Best of '91." Take control of PCs miles away by modem. View & operate any Windows, DOS or VGA/EGA program ... **intro. price until 3/31/92 $129.**

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World Class Winner!

PC Power & Cooling ... 2 years
REPLACEMENT POWER SUPPLIES
3203 Turbo Cool 200 ..... $149.
7915 Turbo Cool 300 ..... 159.

Practical Peripherals ... 5 years
3103 2400 Baud Internal Modem ..... 85.
3102 2400 Baud External Modem ..... 179.
8993 2400 Baud Internal Modem *(V.42 bis)* .. 169.
8994 2400 Baud External Modem *(V.42 bis)* .. 199.
4542 2400 Baud Internal Modem for PS/2 ... 229.
8132 PM2400 Pocket Modem ..... 109.
2266 PM9600 Internal Modem ..... 399.
7934 PM9600SA Modem ..... 469.
2264 PM2400FX96 *(modem/fax board)* ..... 95.

Prometheus ... 2 years
1222 ProModem Ultima *(9600 V.32 bis/9600 fax)* 489.

Targus ... lifetime
1305 Universal Notebook *(computer case)* .... 69.

TheComplete PC ... 2 years
8082 Half Page Scanner/400 with ReadRight . 289.
5828 TheComplete Communicator ..... 319.

Toshiba ... 1 year
3361 T2000SXE Notebook *(60 MB)* ..... call
4137 T2200SX Notebook *(60 MB)* ..... call

Tripp Lite ... 2 years
6199 Isobar 4-6 *(4 outlets, Gold Seal Warranty)* . 49.
6200 Isobar 6-6 *(6 outlets, Gold Seal Warranty)* . 59.
6201 Isobar 8-12 *(8 outlets, Gold Seal Warranty)* 69.
6018 LC1200 *(1200 Watt Line Conditioner)* ... 159.

Video 7 ... 7 years
9768 VRAM II VGA 1 MB ..... 329.

Zoom Telephonics ... 7 years
1307 Int. 2400 Baud w/9600 Baud Fax Modem 105.
1178 Ext. 2400 Baud w/9600 Baud Fax Modem 115.
1181 2400 Baud V.42 bis Modem *(2 year)* .... 129.
3574 Ext. 2400 Baud V.42/9600 Baud Fax ... 169.
1167 2400 Baud Internal Modem ..... 65.
1166 2400 Baud External Modem ..... 75.
3075 9600 V.32 Turbo Internal Modem *(2 yr.)* . 329.
1494 9600 V.32 Turbo External Modem *(2 yr.)* . 329.
4400 24/96 Int. Fax Modem/Winfax Pro Bundle 155.
4401 24/96 Ext. Fax Modem/Winfax Pro Bundle 159.

Prometheus ... 2 years
1222 *ProModem Ultima*—New lower price! Only 14,400 bps (V.32 bis) modem w/9600 bps S/R fax & all the software, incl. Maxfax 3.0. Features V.42 bis/MNP 5 data compression/error correction for up to 4 times the throughput! . **$489.**

DRIVES

Conner Peripherals ... 1 year
2339 CP30104 120 MB IDE HD *(19 ms)* ..... 399.
1337 CP3204 200 MB IDE HD *(16 ms)* ..... 599.

IOMEGA ... 1 year
We are an authorized Iomega Service Center.
2224 Bernoulli II Transportable 90 MB ..... 799.
2616 Internal 90 MB Bernoulli ..... 799.
2500 PC2B Controller ..... 199.
2530 90 MB Cartridge ..... 149.
2467 90 MB Cartridge Tripak ..... 439.

Mountain Network Solutions ... 2 years
2917 40-60 MB Internal Tape Drive ..... 259.
6153 DC2120 Tape Cartridge *(5 pack)* ..... 149.

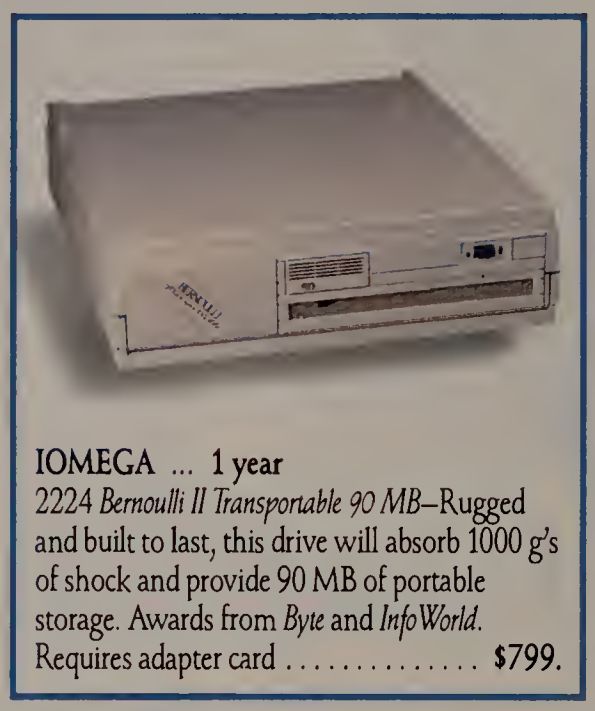
Pacific Rim ... 1 year
1304 1.2 MB External *(for any parallel port)* .. $239.
2761 1.44EX MB External *(for any parallel port)* 239.

Quantum ... 2 years
8304 Plus Hardcard II XL 50 MB *(9 ms)* ..... 299.
8287 Plus Hardcard II XL 105 MB *(9 ms)* ..... 449.
4060 105 MB Drive Kit for MC PS/2's *(13 ms)* . 789.

TEAC ... 1 year
4670 1.44 MB Drive for PC/XT *(3½")* ..... 69.
4326 1.44 MB Drive for AT *(3½", w/Basetech)* . 89.
4951 720k Drive for PC/XT *(3½")* ..... 69.
6951 1.2 MB Drive for AT *(5¼")* ..... 75.

MEMORY

6556 256k DRAM *(100 ns, set of 9)* ..... 19.
5510 1 MB x 9 SIMMs *(80 nanosecond)* ..... 55.
2497 4 MB x 9 SIMMs *(80 nanosecond)* ..... 199.
5746 1 MB Chips *(80 ns, set of 9)* ..... 55.
7813 256K x 4 Chips ..... ea. 7.50



IOMEGA ... 1 year
2224 Bernoulli II Transportable 90 MB—Rugged and built to last, this drive will absorb 1000 g's of shock and provide 90 MB of portable storage. Awards from *Byte* and *InfoWorld*. Requires adapter card ..... **$799.**

AddStor ... NCP
4090 ▣ *SuperStor 1.3*—Increase your disk space 2-3 times and compress data on floppies and external media. Easy installation and use, with no artificial DOS commands. Completely data safe and transparent ..... **$83.**

DISKS/MEDIA

Fuji ... lifetime
2215 3½" HD Disks *(10)* ... 15. 2241 *(50)* ... 69.
2239 3½" HD Disks Color *(Qty. 10)* ..... 18.
2214 3½" DS Disks *(10)* ... 9. 2242 *(50)* ... 39.
2243 3½" DS Disks Color *(Qty. 10)* ..... 10.
Fuji ¼" Data Cartridges ..... call

Sony ... lifetime
3291 5¼" DS/DD 360k Disks *(Qty. 10)* ..... 7.
3292 5¼" HD Disks *(Qty. 10)* ..... 12.
3297 3½" DS Disks *(10)* .. $9. 6148 *(30)* .. $25.
3298 3½" HD Disks *(10)* ... 15. 6375 *(30)* ... 42.
1603 DG60M 4mm Data Cartridge *(1.3 GB)* ... 16.
2520 DG90M 4mm Data Cartridge *(2 GB)* .... 22.
1609 QG112M 8mm Data Cartridge *(5 GB)* .... 15.
8185 QD2040 Tape Cartridge ..... 14.
3988 QD2080 .... 19. 1895 QD2120 .... 21.
6715 QD6150 .... 23. 1602 QD6250 .... 29.

3M ... lifetime
3943 DC2000 .... 17. 1581 DC2120 .... 24.

OUR POLICY

- We accept VISA and MASTERCARD.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.).
- No sales tax, except Ohio residents (please add applicable tax).
- All U.S. shipments insured; no additional charge.
- APO/FPO orders shipped 1st Class Mail.
- International orders U.S. $250 minimum. Manufacturer support and upgrade eligibility may be limited outside the U.S.A.
- Upon receipt and approval, personal and company checks clear the same day for immediate shipment of your order.
- Corporate P.O.s accepted subject to approval.
- COD max. $1000. Cash or cashier's check.
- 120 day limited warranty on all products. Defective software replaced immediately. Defective hardware repaired or replaced at our discretion. All items subject to availability. Prices and promotions subject to change without notice.
- To order, call us Monday through Friday 8:00 a.m. to 1:00 a.m., or Saturday 9:00 a.m. to 5:30 p.m. Eastern Time. You can call our business offices at 603/446-3383 Monday through Friday 9:00 a.m. to 5:30 p.m.

Practical Peripherals ... 5 years
2264 PM2400FX96 Fax Modem—2400 bps internal modem with true 9600 bps send/receive capabilities. A Hayes compatible 1/2 card, it also allows you to receive faxes in the background, & includes QuickLink II. . . **$95.**

SHIPPING

Note: Accounts on net terms pay actual shipping.

Continental US:
- For heavy hardware items such as printers, monitors, Bernoulli Boxes, etc. pay actual charges. Call for UPS 2nd-Day & Next-Day-Air.
- For all other items, add $3 per order to cover UPS Shipping. For such items, we automatically use Airborne Express at no extra charge if you are more than 2 days from us by UPS ground.

Hawaii:
- For monitors, printers, Bernoullis, computers, hard drives, and power backups, actual UPS Blue charge will be added. For all other items, add $3 per order.

Alaska and outside Continental US:
- Call 603/446-7721 for information.

PC Confusion.

Don't know which way to turn?
(Or, the node not taken.)

We tend to take the road less travelled up here in the lovely, dark, and deep woods of Marlow, NH (pop. 568). We've introduced services like toll-free technical support, recycled packing materials, and One Minute Mail Order™ long before anyone else in PC mail order. And to our customers, that has made all the difference. Because they know we have many promises to keep and will, in fact, go miles before we sleep to clear up any confusion about any program or peripheral you buy from us.

You see, when we first started in 1982, the hardest decision anyone had to make was whether to get an extra serial or parallel port. But over the years technology has taken some bewildering twists and turns, with upgrade paths diverging all over hither and yon. And then some. So before you venture too far into unfamiliar territory, give us a call and we'll get you back on the straight and narrow.

Make a real impression.

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*Super-*VGA MONITORS

High resolution has never been this affordable. Give Windows some room to breathe with one of these 98 super-VGA monitors.

BY JESSE BERST AND SCOTT DUNN

Computing in graphical environments like *Windows* with a VGA monitor is something like running the Boston Marathon in an old pair of Keds: It can be done, but who would want to do it?

Instead of using *Windows* on your cramped old 640 by 480 VGA screen, you could be comfortably cruising at higher resolutions with a multisync monitor. Multisync displays can work, or *sync*hronize, with video adapters that run at 800 by 600, 1024 by 768, and higher. Using *Windows* at these resolutions means a bigger work space, with more of each application visible at once—and that means greater productivity for you.

This Buyers' Guide looks at the most common multisync monitors: those that measure 14 to 17 inches diagonally and are capable of at least 800 by 600 resolution. We've listed a whopping 98 monitors in this range, priced from $399 to $1999 (street prices will be as much as 30 percent off list). How can you sort through this cornucopia and find the monitor that's right for you? Here are some factors you should consider.

CONSTRUCTION BY JONATHAN MILNE

File Edit Transform Effects Arrange Display Special
Now Showing...
SUPER VGA!
See it in high resolution - you won't believe your eyes!

How Big Is Big Enough?

When deciding what size monitor you need, think of a slide show. If you put the slide projector too close to the wall, the image will be too small to show all the details—you get a similar result if you put an information-packed, high-resolution image on a small monitor screen. But move the projector back, or get a larger monitor, and the image will become big enough to read.

A larger monitor makes sense if you often juggle two or more full-blown *Windows* apps, if you must view many spreadsheet columns, or if you do detailed design. On the other hand, a 15- or even a 14-inch monitor will do a fine job at low resolutions, though you'll have a smaller *Windows* work space and less detail.

We've grouped monitors by diagonal screen measurements in the table, but actual viewable area varies among monitors of the "same" size, especially larger models. The best thing to do is look at the monitor before you buy and be sure you're getting as much screen as you think you are.

You may like the idea of a 17-inch monitor, but will it fit on your desk? Remember that monitors can be imposingly large. Consider also the shape of the screen. None except the Zenith Data Systems ZCM-1650 is completely flat, but

A PIVOTAL NEW PRODUCT

Two views for the price of one: That's the unique appeal of the Radius Full-Page Pivot monitor.

Do you need to see all 12 months of your budgeting spreadsheet at once? Use the Pivot in landscape orientation. Want to see a full page of that newsletter? Simply grasp the monitor and rotate it to portrait orientation. The display automatically reorients itself.

Normal monitors display the screen in landscape orientation, wider than high. At 800 by 600 resolution, that

SUPER-VGA MONITORS

Manufacturer	Product	Price	Dimensions (inches)	Flat screen[1]	RESOLUTION Noninterlaced @ 1024x768	RESOLUTION Dot pitch (mm)
14 INCH						
ACER	AcerView 33LR	$669	13.4x14x15	N	N	0.28
	AcerView 25	$799	13.4x14x16	N	Y	0.28
ADI SYSTEMS	MicraScan 3E	$759	14.3x14.6x15.2	N	Y	0.28
AMAX ENGINEERING	Impression CM1448M	$450	14.4x15.2x15.4	N	Y	0.28
AMERICAN MITAC	M1458/N-I	$795	13.9x14x15.1	N	Y	0.28
AOC INT'L	CM-336	$599	13x14x15	N	Y	0.28
CORDATA TECHNOLOGIES	CMC-1414BA	$589	11.4x13.9x15	N	Y	0.28
CTX INT'L	5468-NI	$699	14.4x14.8x14.2	N	Y	0.28
DELL	UltraScan 14C	$599	14.9x13.9x14.7	N	Y	0.28
EVEREX SYSTEMS	Evervision SVGA	$599	14.3x16.4x14.9	N	N	0.28
FORA	Addonics MON-7C8B	$495	13.4x14x16.1	N	Y	0.28
GOLDSTAR	1490	$849	14.1x14x16.3	N	Y	0.25
IBM	PS/2 8514	$1665	13.6x14x15.3	Y	Y	0.28
IIYAMA	DR-3114	$595	13.7x14x15.3	N	N	0.28
	MR-5314	$729	13.7x17.4x18.2	N	Y	0.28
IOCOMM	ThinkSync 4E	$495	14x14.6x15.5	N	Y	0.28
KFC-COMPUTEK	CT-14	$320	13.4x13.5x14.5	N	Y	0.28
LOOP TECHNOLOGY	CT1458N	$495	15.4x14.4x13.6	N	Y	0.28
MAG INNOVISION	MX14S	$799	14.1x14x16.3	Y	Y	0.25
MITSUBA	M710VH	$399	10.5x13x14.5	Y	N	0.28
MITSUBISHI	Diamond Scan 14	$839	13x14x15	N	N	0.28
NANAO	Flexscan 9065S	$999	14.6x14.2x16.2	N	Y	0.28
OPTIQUEST	1000D	$595	14.3x14.6x15.2	N	Y	0.28
PACKARD BELL	PB8528SVG	$899	14.8x14.3x15.8	N	N	0.28
PANASONIC	PanaSync C1381i	$699	14.4x13.9x14.8	N	N	0.28
	PanaSync C1395	$899	14.4x13.9x14.8	N	Y	0.28
PC CRAFT	Power II VGAM/3A	$429	15.9x16.2x17.5	N	N	0.28
	Pawer II NVGAM/4A	$499	16.4x16.1x17.5	N	Y	0.28
PHILIPS	Magnavax 7CM329	$699	14.1x14x15.5	N	N	0.28
QUME	QM835	$649	12.5x13.5x14	N	N	0.28
	QM848	$759	13.7x14x15.4	N	Y	0.28

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means you can see about half a page; at 768 by 1024, about two-thirds. In contrast, in portrait mode the Pivot lets you see the whole page at 768 by 1024.

Who should buy the Pivot? You're an ideal candidate if you frequently mix and match spreadsheets and word processing, or if you're a desktop publisher who can't talk the boss into a dual-page monitor. The Pivot is not the ultimate graphic arts solution, but it's a good combination of value and high-end graphics features.

To take advantage of the Pivot's swiveling capabilities, you'll need a Radius display adapter and the special Radius software drivers. We examined the Pivot with the $449 Radius SVGA MultiView adapter and two high-resolution *Windows* drivers (800 by 600 and 1024 by 768, with a 72-Hz refresh rate). The adapter also came with drivers for *AutoCAD, WordPerfect,* and *1-2-3*. Additional cards and drivers are on the way, according to Radius.

You can find single-page black-and-white monitors, and you can pay big bucks for a dual-page color monster. But the $1249 15-inch Radius Full-Page Pivot is the only single-page display that lets you see that page in color, and it's certainly the only monitor that will give you both portrait and landscape views. —*Jesse Berst*

Radius Full-Page Pivot display $1249

Radius SVGA MultiView interface $449

Radius, Inc.
1710 Fortune Dr., San Jose, CA 95131
408/434-1010
Reader service no. 601

REFRESH RATES		CONTROLS				SERVICE AND SUPPORT				
70 Hz or higher @ 800 x 600	70 Hz or higher @ 1024 x 768	Size horizontal/ vertical	Position horizontal/ vertical	Pincushion/ barrel distortion	Built-in micro-processor	SWEDAC compliance	Warranty	Money-back guarantee	Toll-free support	Reader service number
N	N	Y/Y	N/Y	N	N	MPR I	2 years	none	N	601
Y	Y	Y/Y	N/Y	N	N	N	2 years	none	N	601
Y	N	Y/Y	Y/Y	Y	Y	MPR II	2 years	none	Y	602
Y	N	N/Y	Y/Y	N	N	N	1 year	none	N	603
Y	Y	N/Y	Y/Y	N	N	N	1 year	1 month	Y	604
N	N	Y/Y	Y/Y	N	N	N	1 year	none	Y	605
Y	Y	Y/Y	N/Y	N	N	N	1 year	none	Y	606
Y	N	N/Y	Y/Y	N	N	N	1 year	none	Y	607
Y	Y	Y/Y	Y/Y	N	N	N	1 year	1 month	Y	608
N	N	Y/Y	Y/Y	Y	N	N	1 year	none	N	609
Y	Y	Y/Y	Y/Y	N	N	N	1 year	1 month	N	610
Y	Y	Y/Y	Y/Y	N	N	N	1 year[2]	none	Y	611
N	N	N/N	N/N	N	N	MPR II	1 year	none	Y	612
N	N	N/Y	Y/N	N	N	MPR II	1 year	none	N	613
Y	Y	Y/Y	Y/Y	N	N	MPR II	1 year	none	N	613
Y	N	N/Y	Y/Y	Y	N	N	1 year	1 month	N	614
Y	N	Y/N	N/N	N	N	N	1 year	none	N	615
Y	N	Y/Y	Y/Y	N	N	N	1 year	none	N	616
Y	Y	Y/Y	N/Y	N	Y	MPR II	1 year	none	N	617
Y	N	Y/Y	Y/Y	N	N	N	1 year	none	N	619
N	N	Y/Y	Y/Y	N	N	N	1 year	none	Y	620
Y	N	Y/Y	Y/Y	Y	N	MPR II	1 year	none	N	621
Y	N	Y/Y	Y/Y	N	Y	MPR II	1 year	none	N	622
N	N	Y/Y	N/Y	N	N	N	1 year	up to dealer	Y	623
N	N	Y/Y	Y/Y	N	N	MPR II	1 year	none	Y	624
N	N	Y/Y	Y/Y	N	N	MPR II	1 year	none	Y	624
N	N	N/Y	Y/N	N	N	N	1 year	none	N	625
Y	N	Y/Y	Y/N	N	N	N	1 year	none	N	625
N	N	N/N	Y/Y	N	N	MPR II	2 years	none	Y	626
N	N	N/Y	Y/Y	N	N	N	1 year	none	Y	627
Y	N	N/Y	Y/Y	N	N	N	1 year	none	Y	627

SUPER-VGA MONITORS *continued*

Manufacturer	Product	Price	Dimensions (inches)	Flat screen[1]	RESOLUTION Noninterlaced @ 1024 x 768	Dot pitch (mm)
14 INCH						
RELISYS	RE1422	$745	15 x 14 x 15	N	Y	0.28
	RE1458	$795	13.4 x 15 x 15.6	N	Y	0.28
SAFE TECHNOLOGIES	Ultra-Low 7000	$695	11 x 14 x 13	Y	Y	0.25
SAMPO	AlphaScan Plus	$695	14.1 x 15.1 x 14.9	N	Y	0.28
SCEPTRE TECHNOLOGIES	CM-6N	$695	14 x 14 x 15	N	Y	0.28
SEIKO	CM1440	$749	13 x 14 x 16	Y	N	0.25
	CM1450	$999	13 x 14 x 16	Y	Y	0.25
SIIG	VS 1401	$569	17 x 18 x 18	N	N	0.28
SONY	CPD-1304	$999	13.7 x 13.9 x 16.2	Y	Y	0.25
TATUNG	CM-1495H	$749	13 x 14.7 x 15.7	N	N	0.28
TAXAN	MultiVision 788	$695	13.7 x 14 x 15.4	N	Y	0.28
	MultiVision 795	$1095	13.7 x 13.7 x 15.9	N	Y	0.26
TVM	Low Radiation 3A	$479	14 x 14 x 16	N	N	0.28
	MediaScan 4A+	$579	14 x 14 x 16	N	Y	0.28
UNISYS	SVGA-100	$895	13.2 x 14 x 15	N	N	0.28
VIEWSONIC	ViewSonic 4E	$429	13.4 x 14 x 15	N	N	0.28
	ViewSonic 5+	$799	13.4 x 14 x 16	Y	Y	0.25
WYSE TECHNOLOGY	Amdek AM/738+	$599	13.3 x 14.1 x 14.5	N	N	0.28
15 INCH						
ADI SYSTEMS	MicroScan 4A	$859	14.3 x 14.6 x 15.2	Y	Y	0.28
AMERICAN MITAC	M1558 N-I	$395	13.4 x 15.2 x 14.8	Y	Y	0.31
CORDATA TECHNOLOGIES	CMC-15008A	$699	13 x 14.5 x 15.5	Y	Y	0.28
FALCO DATA PRODUCTS	FV15	$465	14 x 14.5 x 16	N	Y	0.28
IIYAMA	MF-5115	$1295	14.6 x 14.4 x 15.8	Y	Y	0.26
IOCOMM	ThinkSync 5	$795	14.2 x 14.6 x 15.7	Y	Y	0.28
MAG INNOVISION	MX-15F	$899	13.9 x 14 x 17.2	Y	Y	0.28
NEC	MultiSync 3FGX	$749	15.6 x 14.6 x 16.3	Y	Y	0.28
	MultiSync 4FG	$899	15.6 x 14.6 x 16.3	Y	Y	0.28
OPTIQUEST	2000 D	$795	14.3 x 14.6 x 15.2	Y	Y	0.28
RADIUS	Full Page Pivot	$1249	18 x 12.5 x 17	Y	Y	0.28
SAMSUNG	SyncMaster 15	$849	16 x 14.8 x 15.6	Y	Y	0.28
SCEPTRE TECHNOLOGIES	CL-615	$1095	15 x 15 x 16	Y	Y	0.28
TAXAN	MultiVision 550	$945	15.8 x 14.7 x 15.4	Y	Y	0.28
TVM	Low Radiation 5A+	$749	15 x 15 x 16	Y	Y	0.28
ZDS	ZCM-1650	$1699	15.5 x 15.5 x 17.5	N	Y	0.28
16 INCH						
AAMAZING TECHNOLOGIES	CM-1726K	$1599	16.3 x 17 x 18.9	Y	Y	0.26
DELL	GPD 16C	$999	14 x 15.9 x 18	N	Y	0.31
IBM	PS/2 8515	$950	14.2 x 15.8 x 16.3	Y	Y	0.31
MITSUBISHI	Diamond Scan 16	$1499	14 x 16 x 18	N	Y	0.28
NANAO	Flexscan 9080i	$1499	16 x 15.8 x 17.8	N	Y	0.28
NEC	MultiSync 4DS	$1149	15.2 x 15.3 x 18.7	N	Y	0.28
PRINCETON GRAPHIC SYSTEMS	Ultra 1400	$899	14.7 x 14.1 x 15.3	N	N	0.28
17 INCH						
ADI SYSTEMS	MicroScan 4E	$1059	15.6 x 16 x 17.5	Y	Y	0.31
AMERICAN MITAC	M1740 N-I	$1295	15.2 x 15.7 x 9.3	Y	Y	0.31
AOC INT'L	CM-735	$1399	16 x 15 x 17	Y	Y	0.26
CORDATA TECHNOLOGIES	CMC-1700M	$1309	15.5 x 16.7 x 16.6	Y	Y	0.28
EPSON AMERICA	Professional Series Monitor	$1539	15.5 x 16.4 x 17.4	Y	Y	0.26
FORA	Addonics MON-C171	$995	16.1 x 16.1 x 17.7	Y	Y	0.31
IIYAMA	MF-5117	$1595	16.3 x 16.1 x 16.5	Y	Y	0.28
IOCOMM	ThinkSync 7M	$1995	17 x 16.3 x 16.8	Y	Y	0.28
LOOP TECHNOLOGY	CN1764	$1295	21.9 X 21.9 X 21.9	Y	Y	0.28
MAG INNOVISION	MX-17F	$1549	16.7 x 16.3 x 19.5	Y	Y	0.26
MITSUBA	M710VR	$1599	12.5 x 16 x 19	Y	Y	0.26
NANAO	Flexscan F550i	$1899	16 x 15.8 x 17.8	Y	Y	0.28

REFRESH RATES		CONTROLS				SERVICE AND SUPPORT				
70 Hz or higher @ 800 x 600	70 Hz or higher @ 1024 x 768	Size horizontal/ vertical	Position horizontal/ vertical	Pincushion/ barrel distortion	Built-in micro-processor	SWEDAC compliance	Warranty	Money-back guarantee	Toll-free support	Reader service number
Y	N	Y/Y	Y/N	N	N	N	1 year	none	N	628
Y	Y	Y/Y	Y/Y	N	N	N	1 year	none	N	628
Y	Y	Y/Y	Y/Y	Y	N	MPR II	2 years	1 month	N	629
Y	Y	Y/Y	Y/Y	N	N	MPR II	1 year	1 month	N	630
Y	N	N/Y	N/Y	N	N	N	1 year	1 month	N	631
N	N	Y/Y	Y/Y	N	N	N	1 year	none	N	632
Y	N	Y/Y	Y/Y	N	N	N	1 year	none	N	632
N	N	N/Y	N/N	N	N	N	1 year	1 month	N	633
Y	N	Y/Y	Y/Y	N	N	N	1 year [3]	none	N	634
N	N	Y/Y	Y/Y	N	N	N	1 year	none	Y	635
Y	N	Y/Y	Y/N	N	N	N	2 years	1 month	Y	636
Y	Y	Y/Y	Y/Y	N	N	N	2 years	1 month	Y	636
N	N	Y/Y	Y/Y	N	N	MPR II	2 years	none	Y	637
Y	N	N/Y	Y/N	N	N	N	2 years	none	Y	637
N	N	Y/Y	Y/Y	Y	Y	N	1 year	none	Y	638
N	N	Y/Y	Y/Y	N	N	N	1 year	none	N	639
Y	Y	Y/Y	Y/Y	N	N	N	1 year	none	N	639
N	N	Y/Y	Y/N	N	Y	N	1 year	none	Y	640
Y	Y	Y/Y	Y/Y	Y	Y	MPR II	2 years	none	Y	641
Y	Y	N/Y	Y/Y	N	N	N	1 year	1 month	Y	642
Y	Y	Y/Y	N/Y	N	N	N	1 year	none	Y	644
Y	N	Y/Y	Y/Y	N	N	N	1 year	none	Y	645
Y	N	Y/Y	Y/Y	N	N	MPR I	1 year	1 month	N	646
Y	Y	N/Y	Y/Y	Y	N	N	1 year	1 month	N	647
Y	Y	Y/Y	N/Y	N	Y	MPR II	1 year	none	N	648
Y	N	Y/Y	Y/Y	Y	N	MPR II	1 year [4]	none	Y	649
Y	Y	Y/Y	Y/Y	Y	Y	MPR II	1 year [4]	none	Y	649
Y	Y	Y/Y	Y/Y	N	Y	MPR II	1 year	none	N	650
Y	N	N/N	N/N	N	N	MPR II	1 year	none	N	651
Y	Y	Y/Y	Y/Y	Y	N	N	1 year	none	Y	652
Y	Y	N/Y	N/Y	N	N	N	1 year	1 month	N	653
Y	Y	Y/Y	Y/Y	N	N	N	2 years	1 month	Y	654
Y	Y	Y/Y	Y/Y	N	Y	MPR II	2 years	none	Y	655
Y	Y	N/Y	Y/Y	N	N	N	1 year	none	N	656
Y	Y	Y/Y	Y/Y	N	N	N	1 year	none	N	657
Y	Y	Y/Y	Y/Y	Y	Y	N	1 year	1 month	Y	658
N	N	N/N	N/N	N	N	MPR II	1 year	none	Y	659
Y	Y	Y/Y	Y/Y	Y	Y	MPR I	1 year	none	Y	660
Y	Y	Y/Y	Y/Y	Y	N	MPR I	1 year	none	N	661
Y	Y	Y/Y	Y/Y	N	Y	MPR II	1 year [4]	none	Y	662
N	N	Y/Y	Y/Y	N	N	N	1 year [4]	none	Y	663
Y	Y	Y/Y	Y/Y	Y	Y	N	2 years	none	Y	664
Y	Y	N/Y	Y/Y	N	N	N	1 year	1 month	Y	665
Y	Y	Y/Y	Y/Y	N	N	N	1 year	none	Y	666
Y	Y	Y/Y	Y/Y	N	N	N	1 year	none	Y	667
Y	Y	Y/Y	Y/Y	Y	N	N	1 year	none	Y	668
Y	Y	Y/Y	Y/Y	N	N	N	1 year	1 month	N	669
Y	N	Y/Y	Y/Y	N	N	MPR I	1 year	1 month	N	670
Y	Y	Y/Y	Y/Y	N	Y	N	1 year	1 month	N	671
Y	Y	Y/Y	N/Y	N	Y	MPR II	1 year	none	N	672
Y	Y	Y/Y	Y/Y	N	Y	N	1 year	none	N	673
Y	Y	Y/Y	Y/Y	N	Y	N	1 year	none	N	674
Y	Y	Y/Y	Y/Y	Y	Y	MPR II	1 year	none	N	675

FIGHTING THE FLICKER FACTOR

Our mothers always told us not to sit too close to the television set. Now many of us sit within inches of a video display for hours, and our eyes have had it, in large part because of screen flicker.

A monitor works by flashing images on the screen many times each second. If it flashes them too slowly (less than about 60 to 70 times per second, depending on screen size), many people will experience eye fatigue, eyestrain, and headaches. That's screen flicker.

To make computing as pleasant as possible, follow these peeper-pampering tips as you shop for a monitor.

- Check the refresh rate. The single biggest cause of monitor flicker is the speed with which your video adapter card paints the screen. When testing a monitor at a dealer, ask to see it attached to a video adapter that closely matches your own. At 1024 by 768 resolution, look for a refresh rate of 70 Hz or faster.

- Avoid interlacing. Select a monitor that paints the screen in a single, or noninterlaced, pass at the resolutions that you are going to be using.

- Test the monitor with a white screen background in a brightly lit room. If a monitor is flicker-prone, these conditions are most likely to make it visible.

- Test for flicker with fine lines. If possible, use a draw program to create a test screen: Draw several horizontal one-point lines spaced one-point apart against a white background. When you're testing a monitor, load the screen then sit back and watch. If the lines appear to strobe or pulsate, just say no.

- Look from the side. You may not be able to see flicker when looking straight at a monitor, but your peripheral vision is more sensitive to motion. Look at a spot 12 inches to either side of the monitor, then notice the screen from the corner of your eye. If it seems to shimmer, you're seeing flicker. Most people can easily detect vertical refresh rates of 60 Hz or slower using this little trick.

- Adjust your work space. Once you've made your purchase, you can minimize eyestrain by using a larger type size and a nonwhite background color (light gray, for instance) for text, eliminating glare, and avoiding fluorescent lighting, which has a flicker of its own.

SUPER-VGA MONITORS *continued*

Manufacturer	Product	Price	Dimensions (inches)	Flat screen[1]	RESOLUTION Noninterlaced @ 1024 x 768	RESOLUTION Dot pitch (mm)
17 INCH						
NEC	MultiSync 5FG	$1599	17.8 x 16.4 x 14.8	Y	Y	0.28
OPTIQUEST	4000 D	$1495	16.5 x 16.4 x 16.5	Y	Y	0.26
PHILIPS CONSUMER ELECTRONICS	Magnavox CM9217	$1499	16.8 x 19.6 x 21	Y	Y	0.31
QUME	QM870	$1499	16.5 x 16.4 x 16.5	Y	Y	0.26
RELISYS	RE1776	$1495	16.6 x 16.4 x 16.6	Y	Y	0.26
SAMPO	AlphaScan 17E	$1695	16.5 x 16.1 x 17.3	Y	Y	0.26
SAMSUNG	SyncMaster 4	$1299	17.4 x 16.5 x 17.6	Y	Y	0.31
SONY	CPD-1604S	$1699	16 x 16.8 x 17.3	Y	Y	0.25
SUNSHINE TECHNOLOGIES	CM-17B	$1599	16.6 x 16.4 x 16.5	Y	Y	0.25
TATUNG	CM-17MBD	$1799	15 x 16.2 x 18.9	Y	Y	0.26
TAXAN	MultiVision 850	$1495	16.5 x 16.1 x 17.3	Y	Y	0.31
TVM	MediaScan 6A	$1399	16 x 16 x 17	Y	Y	0.26
VIEWSONIC	ViewSonic 7	$1599	17.1 x 16.3 x 18.9	Y	Y	0.28
WYSE TECHNOLOGY	Amdek AM/817	$1299	16.6 x 16.4 x 16.5	Y	Y	0.26

[1] Only the ZDS ZCM-1650 is truly flat.
[2] Three years on CRT.
[3] Two years on CRT.
[4] Two years on parts.

even those that have a nearly flat screen tend to minimize glare and distortion.

Resolution and Interlacing

Resolution refers to the number of pixels drawn on the screen—the higher the resolution, the sharper the image. If you're going to stick with text-based applications, you can skimp on resolution. But if you're planning to use *Windows*, be sure your monitor can handle at least 800 by 600.

At resolutions of 1024 by 768 and above, some of these monitors use *interlacing*. Monitors work by firing beams of electrons against the inside of the screen; the beams "paint" horizontal lines across the screen, one at a time, from top to bottom.

When a monitor is interlacing, the electron gun first paints the even-numbered lines and then goes back and paints the odd-numbered lines. As a result, screen flicker is more noticeable than when a monitor is not interlacing, that is, painting each line in succession. Be sure your monitor does not interlace at the resolution you plan to use.

You should also check the *dot pitch*, which measures the space between phosphor dots on the screen. In general, the smaller the dot pitch, the sharper the image. A 17-inch monitor should have a dot pitch of .31mm or less; a 14- or 15-inch screen, .28mm or less.

Refresh Rates and Flicker

An undervalued consideration for monitors is the *refresh rate*. The vertical refresh rate is the frequency with which each line on the screen is repainted. A slow refresh rate, like interlacing, will make screen flicker more noticeable.

Exactly how noticeable depends on the user, but as a general rule, a refresh rate of 70 Hz or faster is best—especially with *Windows* because its light backgrounds make flicker more noticeable. All multisyncs can run at 70 Hz or higher at standard 640 by 480 VGA resolution, but only some do so at higher resolutions. Check the table to see if the monitor you are considering will run at higher resolutions you may be using.

Taking Control

All monitors have controls for adjusting brightness and contrast, but you may want more. If you're going to switch between different resolutions, you'll want *horizontal and vertical size* controls to avoid getting an 11-inch image on a 14-inch screen. Look for horizontal and vertical *position* controls as well, so you can center the display.

Pincushioning and *barrel distortion* controls let you straighten lines that appear to bow near the edge of the screen. If the monitor has a *built-in microprocessor*, at least some of the sizing functions should be automatic.

Radiation and SWEDAC Compliance

Though scientists are still up in the air about the dangers of monitor radiation, and no safe level has been established, many buyers are deciding it's better to be safe than sorry. The Swedish national testing board (SWEDAC) has established the MPR I and stricter MPR II guidelines, which set maximum levels of allowable electromagnetic radiation. One extra bonus: Low-radiation monitors draw less dust to the screen.

Service and Support

Check out the warranty. One year is standard, but some vendors offer two. If you're ordering a monitor by mail, insist on a money-back guarantee. When buying by mail, be sure to get a demo somewhere first. More than any other computer component, a monitor cannot be judged by specs alone: It must be seen to be appreciated.

Jesse Berst is a contributing editor for PC World. *He and Scott Dunn wrote* 101 Windows Tips *(Peachpit Press, Berkeley, California).*

REFRESH RATES		CONTROLS				SERVICE AND SUPPORT				
70 Hz or higher @ 800 x 600	70 Hz or higher @ 1024 x 768	Size horizontal/ vertical	Position horizontal/ vertical	Pincushion/ barrel distortion	Built-in micro-processor	SWEDAC compliance	Warranty	Money-back guarantee	Toll-free support	Reader service number
Y	Y	Y/Y	Y/Y	Y	Y	MPR II	1 year [4]	none	Y	676
Y	Y	Y/Y	Y/Y	N	Y	N	1 year	none	N	677
Y	N	Y/Y	Y/Y	Y	Y	N	1 year	none	Y	678
Y	Y	Y/Y	Y/Y	N	Y	N	1 year	none	Y	679
Y	Y	Y/Y	Y/Y	N	N	N	1 year	none	N	680
Y	Y	Y/Y	Y/Y	Y	Y	MPR II	1 year	1 month	N	681
Y	N	Y/Y	Y/Y	Y	N	N	1 year	none	Y	682
Y	Y	Y/Y	Y/Y	N	N	N	1 year [3]	none	N	683
Y	Y	Y/Y	Y/Y	Y	N	MPR I	1 year	none	N	684
Y	Y	Y/Y	Y/Y	Y	Y	N	1 year	none	Y	685
Y	Y	Y/Y	Y/Y	N	N	N	2 years	1 month	Y	686
Y	Y	Y/Y	Y/Y	N	Y	N	2 years	none	Y	687
Y	Y	Y/Y	Y/Y	N	Y	MPR II	1 year	none	N	688
Y	Y	Y/Y	Y/Y	N	Y	N	1 year	none	Y	689

For more information about all products in this table, circle reader service no. 901.

WHERE TO BUY

Aamazing Technologies Corp.
1050 W. Beacon St.
Brea, CA 92621
714/255-1688

Acer America
2641 Orchard Pkwy.
San Jose, CA 95134
800/733-2237,
408/432-6221

ADI Systems, Inc.
2121 Ringwood Ave.
San Jose, CA 95131
800/675-7322 (CA),
800/228-0530,
408/944-0300 (fax)

AMAX Engineering Corp.
47315 Missian Falls Ct.
Fremont, CA 94539
800/888-2629,
510/651-8886

American Mitac
410 E. Plumeria Dr.
San Jose, CA 95134
800/648-2287,
408/432-1160 (fax)

AOC Int'l (USA) Ltd.
10991 N.W. Airworld Dr.
Kansas City, MO 64153
816/891-8066,
816/891-7882 (fax)

Cordata Technologies, Inc.
1055 W. Victoria St.
Compton, CA 90220
800/233-3602,
310/603-2901 (fax)

CTX Int'l, Inc.
20530 Earlgate St.
Walnut, CA 91789
714/595-6146,
714/595-6293 (fax)

Dell Computer
9505 Arboretum Blvd.
Austin, TX 78759
800/289-3355,
800/727-8320 (fax)

Epson America, Inc.
20770 Madrona Ave.
Torrance, CA 90503
800/922-8911,
310/782-0770

Everex Systems, Inc.
48431 Milmont Dr.
Fremont, CA 94538
800/628-3837,
510/498-1111

Falco Data Products, Inc.
440 Potrero Ave.
Sunnyvale, CA 94086
800/325-2648,
408/745-7123 (fax)

Fora Inc.
3096 Orchard Dr.
San Jose, CA 95134
408/944-0393,
408/944-0392 (fax)

GoldStar Technology, Inc.
3003 N. First St.
San Jose, CA 95134
408/432-1331,
408/954-1143 (fax)

IBM
Old Orchard Rd.
Armonk, NY 10605
800/426-2468

Iiyama North America, Inc.
650 Louis Dr. #120
Warminster, PA 18974
215/957-6543,
215/957-6551 (fax)

IOcomm Int'l Technology
12700 Yukon Ave.
Hawthorne, CA 90250
310/644-6100

KFC-Computek
1585 Sunland Ln.
Costa Mesa, CA 92626
800/253-2872,
714/546-0336

Loop Technology
15355 Barranca Pkwy.
Irvine, CA 92718
800/852-0105,
714/753-7679 (fax)

Mag Innovision
4392 Corporate Center Dr.
Los Alamitos, CA 90720
714/827-3998,
714/827-5522 (fax)

Mitsuba Corp.
1925 Wright Ave.
La Verne, CA 91750
800/648-7822,
714/392-2000 (fax)

Mitsubishi Electronics America, Inc.
5665 Plaza Dr.
Cypress, CA 90630
800/843-2515,
714/236-6176 (fax)

Nanao USA Corp.
23535 Telo Ave.
Torrance, CA 90505
800/800-5202,
310/530-1679 (fax)

NEC Technologies
1255 Michael Dr.
Wood Dale, IL 60191-1094
800/632-4636

Optiquest, Inc.
9830 Alburtis Ave.
Santa Fe Springs, CA 90670
800/843-6784,
310/948-1185

Packard Bell Electronics, Inc.
9425 Canoga Ave.
Chatsworth, CA 91311
818/886-4600

Panasonic Communications & Systems, Co.
Two Panasonic Way
Secaucus, NJ 07094
800/742-8086,
201/348-7000

PC Craft, Inc.
640 Puente St.
Brea, CA 92621
800/733-6666,
714/256-5000

Philips Consumer Electronics Co.
One Philips Dr.
Knoxville, TN 37914-1810
800/722-6224,
615/475-8869

Princeton Graphic Systems, Inc.
1125 Northmeadow Pkwy. #120
Roswell, GA 30076
800/221-1490,
404/664-4103 (fax)

Qume Corp.
500 Yasemite Dr.
Milpitas, CA 95035
800/457-4447,
408/942-4000 (fax)

Radius Inc.
1710 Fortune Dr.
San Jose, CA 95131
408/434-1010

Relisys
320 S. Milpitas Blvd.
Milpitas, CA 95035
408/945-9000,
408/945-0587 (fax)

Safe Technologies Corp.
33 William St.
Needham, MA 02194
800/638-9121,
617/444-7778

Sampo Corporation of America
5550 Peachtree Industrial Blvd.
Norcross, GA 30071
404/449-6220,
404/447-1109 (fax)

Samsung Information Systems America, Inc.
3655 N. First St.
San Jose, CA 95134-1713
800/624-8999 ext. 85,
408/434-5400

Sceptre Technologies, Inc.
560 S. Melrose St.
Placentia, CA 92670
714/993-9193,
714/993-2997 (fax)

Seiko Instruments USA Inc.
1130 Ringwood Ct.
San Jose, CA 95131
408/922-5800,
408/922-5835 (fax)

SIIG, Inc.
6078 Stewart Ave.
Fremont, CA 94538
510/657-8688,
510/657-5962 (fax)

Sony Computer Peripheral Products Co.
655 River Oaks Pkwy.
San Jose, CA 95134
800/352-7669

Sunshine Technologies Inc.
18543 E. Gale Ave.
City of Industry, CA 91748
818/854-5590

Tatung Co. of America
2850 El Presidio St.
Long Beach, CA 90810
800/827-2850,
310/637-8484 (fax)

Taxan America, Inc.
161 Nartech Pkwy.
San Jose, CA 95134
800/648-2926,
408/263-4900

TVM Professional Monitor Corp.
1109 W. Ninth St.
Upland, CA 91786
800/822-8168,
714/985-4788

Unisys Corp.
P.O. Box 500
Blue Bell, PA 19424
800/448-1424

ViewSonic
12130 Mora Dr.
Santa Fe Springs, CA 90670
800/888-8583,
310/946-0711,
213/946-1618 (fax)

Wyse Technology
3471 N. First St.
San Jase, CA 95134
800/438-9973

Zenith Data Systems
2150 E. Lake Cook Dr.
Buffalo Grove, IL 60089
800/553-0331

"I Was So Blown Away By Norton Desktop."

Jim Seymour, PC Week, September, 1991

"Most Valuable Software Product of the Year."

PC Computing, COMDEX, October, 1991

"I can't imagine any Windows user who won't want to own this magnificent, cost-effective collection...the most profound changes in the Windows environment since the introduction of Windows 3.0 itself."

PC Magazine, September, 1991

"Norton Desktop for Windows has 'Software Product of the Year' written all over it."

Infoworld, September, 1991

"While upcoming Windows 3.1 will improve the File Manager, it won't surpass Symantec's offering. Norton Desktop adds a new spark to Windows."

Byte, September, 1991

"Norton Desktop shines in file management."

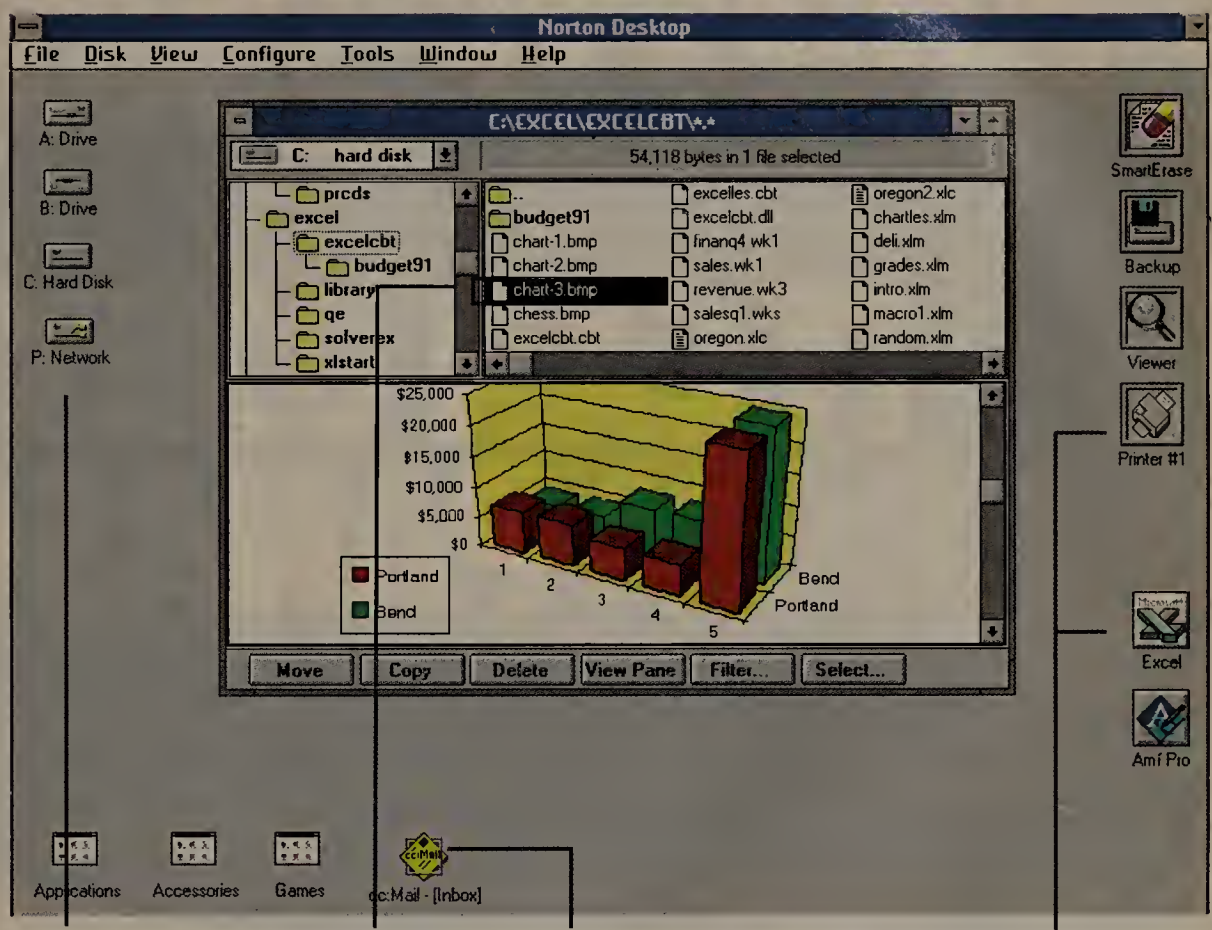
The Wall Street Journal, October, 1991

"For Windows users... shopping for the best Windows utilities bargain around, this is the answer. Every Windows user should have it."

PC Computing, December, 1991

"Run, don't walk, to the nearest store and snap one up."

Byte, September, 1991



Select drives and directories with a click.

Browse and view files without opening applications. More than 40 viewers (including graphics) are built in.

Program management icons can sit right on the desktop.

Keep your favorite applications on your desktop. To view, backup, print or delete a file, just drag it to an icon and click.

NORTON DESKTOP FOR WINDOWS: INTUITIVE FILE MANAGEMENT PLUS A FULL SET OF INTEGRATED UTILITIES. ALL FOR $149.*

No wonder the Norton Desktop™ for Windows is getting unanimous rave reviews. It's the ideal companion for Windows.

It's the seamless, fully integrated interface that makes file and program management as easy as pointing, dragging and clicking. Plus a comprehensive set of built-in utilities–automatic Backup, UnErase,® (restore deleted files), SuperFind,™ (to locate misplaced files), and Disk Doctor,® (recovers crashed files and disks). Plus a gallery of screen savers, an icon editor, and much more. The Norton Desktop for Windows makes working with Windows far easier and more productive.

In short, it's the best thing that ever happened to Windows. Run to your local dealer and see. For the name of the dealer nearest you, call **1-800-343-4714 Ext.729-W or 408-252-3570.**

SYMANTEC.

*Suggested retail price in US only. ©1992 Symantec Corporation. All rights reserved. The Norton Desktop for Windows is a trademark of Symantec Corporation. All other brand and product names mentioned are the trademarks of their respective holders.

Circle 268 on reader service card

IF IT HAS ADOBE* SCALABLE FONTS, COLOR, AND QUIET TECHNOLOGY,

IT CAN ONLY BE FROM PANASONIC.

The KX-P2124, a 24-pin with ATM and color option.*

A few dot-matrix printers offer you scalable fonts.

A few, color. But no other printer offers you scalable fonts...color...and Panasonic® Quiet Technology.

Put our KX-P2124 and 2123 to work and you'll get the flexibility of Adobe Type Manager® and scalable fonts...you'll add drama to your documents with our optional color kit...and you'll hear very little, indeed.

aa ATM®

Put any of our other Quiet Technology printers to work and you can accomplish whatever your needs.

COLOR OPTION

From our 2123, a budget-minded 24-pin with Adobe Type Manager* and optional color...to our 2624 wide-carriage business printer with ATM*,...to our 9-pin 2180 with 6 near letter quality fonts and optional color.

All with the kind of features that made Panasonic printers the leaders of the industry. Such as multiple paper paths, EZ™ Set control panels, and a two-year limited warranty on parts and labor†.

The Panasonic 2000 Series Quiet Technology Printers.

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†See your dealer for warranty details.

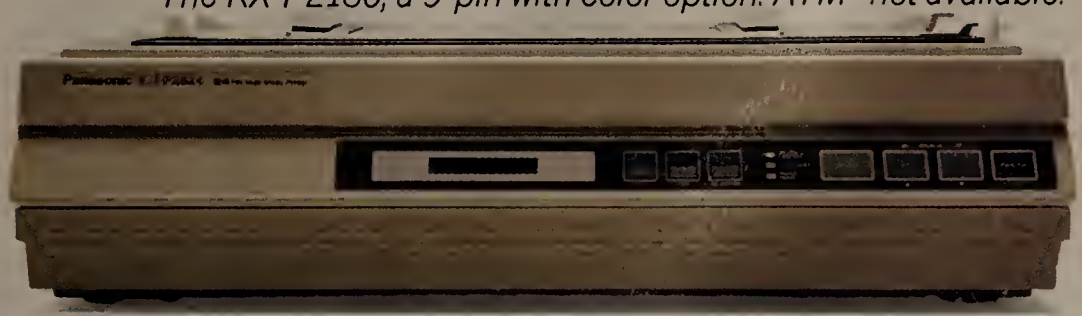
*ATM and Adobe Type Manager are registered trademarks of Adobe. Available on selected printers only.

Panasonic Office Automation OA

ONCE YOU'VE TRIED OUR QUIET TECHNOLOGY PRINTERS, YOU'LL NEVER SETTLE FOR ANYTHING LESS.

The KX-P2123, a 24-pin with ATM and color option.*

The KX-P2180, a 9-pin with color option. ATM not available.*



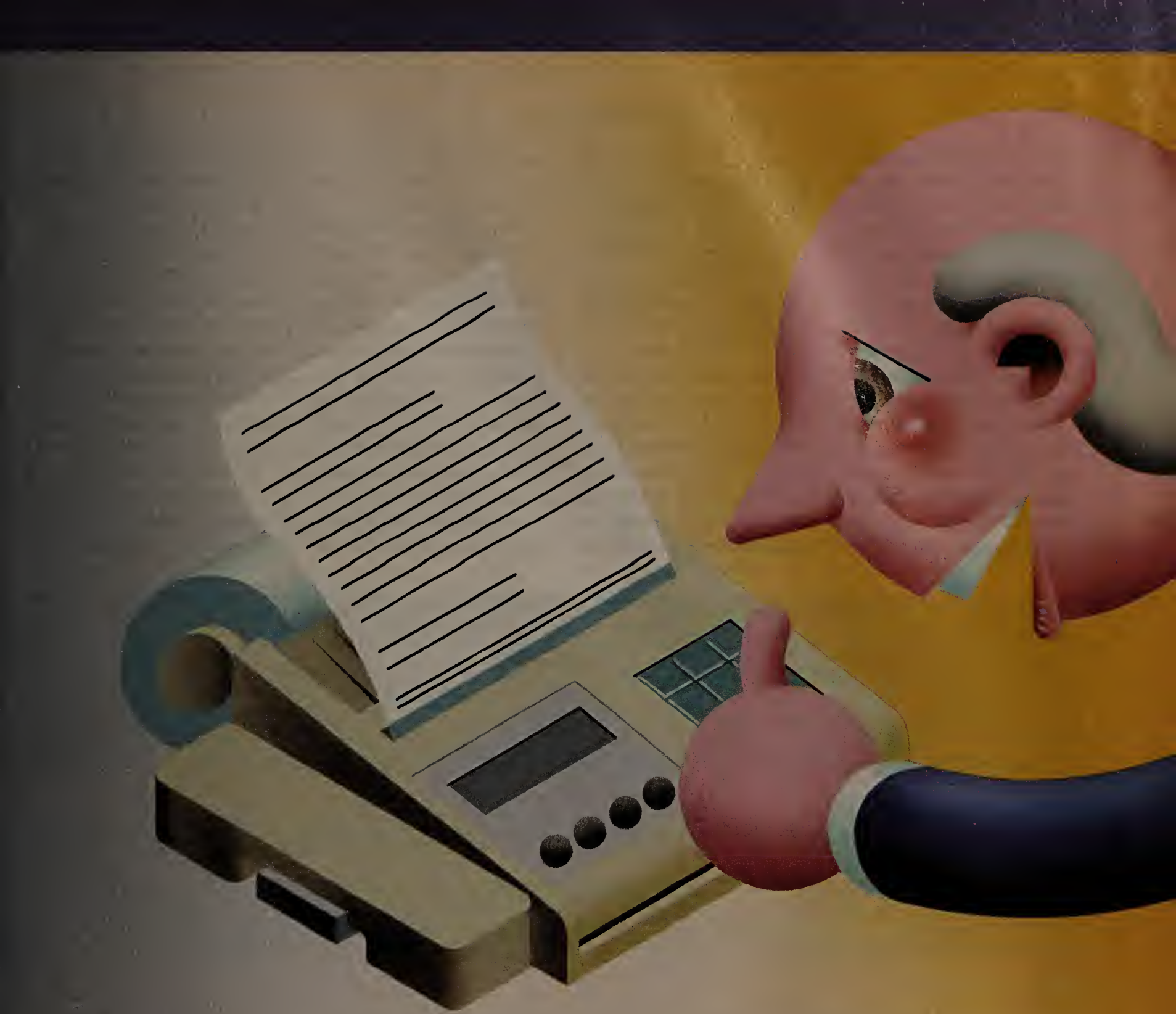
The KX-P2624, a 24-pin with ATM. Color option not available.*

PQ9-PCD

Circle 231 on reader service card

FAX MODEMS

BY
ERIC BROWN
AND SUSAN LUSTY



One-stop, one-slot communications has arrived with low-cost boards that combine 9600-baud fax with 2400-baud Hayes-compatible modems.

The attraction of fax is its immediacy—the moment a fax is sent it appears at its destination. Yet in the real world, it seems to take forever to get a fax from point A to point B. You print a file, fill out a cover sheet, and wait in line for the fax machine or entrust your confidential fax to someone else. The fax arrives instantly at a mail room fax machine, but another hour may pass before it's routed to the addressee.

Once you've used a fax board, you'll laugh at the way you used to handle faxes. With a PC fax-modem board or external fax-modem, you type a memo on your PC and press a key to send the fax. Across the country, the recipient is immediately prompted that the fax has arrived, and at the press of a key the fax appears on screen. That's all there is to it.

ILLUSTRATIONS BY JOSE CRUZ

Fax-modems deliver better image quality than fax machines; they're cheaper; and once you get them installed and working properly, they're much more convenient. Because fax-modems support the Group III fax protocol, you can swap faxes with any other fax machine or fax-modem in the world. Moreover, most fax-modems include 2400-baud Hayes-compatible data modems, so you can call CompuServe and GEnie and swap editable files with a remote PC. The best news is that these versatile gizmos are surprisingly affordable, many costing less than $200.

CLEAN COPY, INSTANT ARRIVAL

As fax continues to make inroads on postal correspondence, image quality becomes critical—that's the main reason users are turning to PC fax. Because you transmit documents straight from your hard disk, you skip the scanning process and its inevitable image corrosion. And if you want to scan in an image, you can buy a higher resolution scanner than those in fax machines and use image-editing software to fix errors.

A fax board can improve the quality of faxes you receive as well. Most fax machines print on low-quality fax paper that tends to curl and fade (the paper is also expensive and contains chemicals that damage the environment). Although you can now buy plain-paper fax machines and plain-paper add-ons to your existing fax machine that redirect output to a laser printer, these options are expensive compared with PC faxing, which lets you use whatever printer you have.

Convenience, timeliness, and security are other reasons to go with PC fax. You can send a document the moment it's created and view an incoming fax on your screen the moment it arrives, and there's not much chance of its contents falling into the wrong hands. Plus, you'll save on paper and printing.

Finally, integrating fax with your PC adds value you could never get from a fax

FAX-MODEMS

			STANDARD FEATURES		FAX
Manufacturer	Product	Price	Bundled software	Class	CAS compatible
AMERICAN DATA TECHNOLOGY	SmartFax II	$299	proprietary	N	N
	SmartFaxplus II	$799	proprietary	N	N
ATI TECHNOLOGIES	2400 ETC Fax	$249	Mirror III Communications, proprietary	I	Y
CALCULUS	EZ-Fax	$399 [3]	EZ-Fax	II	N
CHOICE TECHNOLOGY GROUP	DeskFax Professional 9600	$249	proprietary	I	Y
	DeskFax Pro-Pak	$349	proprietary, Comit	I	Y
	DeskFax Pro-SQ	$389	proprietary, Comit, ScanQuick	I	Y
	DeskFax Pro Plus	$429	proprietary, Comit, ScanQuick	I	Y
THE COMPLETE PC	The Complete Communicator	$499	BitCom, CCom Fax, FaXit for Windows	II	N
	The Complete Fax/9624	$399	BitCom, CFax, FoXit for Windows	II	N
	The Complete Modem Plus	$199	BitCom, FaXit for Windows, Modem Plus	I	N
COMPUCOM	Speedmodem Combo Int	$269	MTEZ	II	Y
	Speedmodem Storm Int	$389	MTEZ	II	Y
	Speedmodem Star Combo Int	$589	MTEZ	II	Y
DATA RACE	Action PC Fax/Modem 2496	$495	ShadowFax	I	N
	Action PC Fax/Modem 9696	$695	ShadowFax	I	N
	Action PC FAX/Modem 9696 with V.32bis	$795	ShadowFax	I	N
DFI	FaxModem-300	$179	BitCom	II	N
E-TECH RESEARCH	BulletModem PC9696MX	$945	SmartFax	II	N
FRECOM COMMUNICATIONS	Fax96 with Modem	$159	proprietary	II	N
	1-Liner Fax/Modem	$239	proprietary	II	N
GAMMALINK	GammaFax CP	$1095	GammaFax Communications	N	Y
	GammaFax XP	$595	GammaFax Communications	N	Y
	GammaFax CPD	$1395	GammaFax Communications	N	N
HAYES MICROCOMPUTER PRODUCTS	Hayes JT Fax 9600B	$499	JT Fax, SmartcomEZ	N	N
IMAGE COMMUNICATIONS	Twincom 24/96i	$149	QuickLink II	II	N
INTEL	SatisFaxtion	$499	FaxIt for Windows	N	Y
LOGICODE TECHNOLOGY	Quicktel 9624 Send & Receive Fax/Modem	$180	QuickLink II	II	N
	Quicktel 9624 Send & Receive Fax/Modem	$218	QuickLink II	II	N
MACRONIX	MaxFax 9624	$249	Comit, MaxTalk for DOS, WinFax	II	N
	MaxFax II	$449	Comit, MaxTalk for DOS, WinFax	II	N
	MaxFax 9696	$649	MaxTalk for DOS, WinFax	II	N

[1] S = software, H = hardware, N = none.
[2] Extra-cost option.
[3] Windows version $499.
[4] Free option.
[5] WP is extra cost.

machine. For example, new fax software from Caere and Delrina can automatically convert incoming faxes into OCR format, which you can translate into editable ASCII text. And with fax-modems that include voice chips, you or a customer can phone in, answer the voice prompts by pressing the touch-tone keypad, and direct the fax board to send specified faxes to particular fax numbers. If you're on a network, there's one more fax option to consider: fax gateways that let LAN users share faxes (see "Fax Gateways Cut Costs on Networks").

BUYING TIPS FOR FACILE FAXING

This guide covers 9600-baud send-and-receive fax boards combined with 2400-baud Hayes-compatible data modems. You may still be able to find some fax-modems that are send-only or that transmit only at 4800 baud, but they're not much cheaper than the most affordable boards included here. Even if you don't plan to receive faxes (perhaps you don't have a direct line), it's

better to plan for the future and get full send-and-receive capability.

All the products listed here are internal boards that fit into an expansion slot in a standard AT-bus PC. You can also buy one of the new portable fax-modems that plug into your serial port, but a board is usually cheaper, and it won't clutter up your desk. The advantage of an external device is, it's more portable (most weigh less than 10 ounces) so you can use the same device on your home PC, office desktop, Macintosh system, and on-the-road laptop. (See February's portable accessories buyers' guide for a list of external fax-modems.)

◆ **A CLASS ACT** Thanks to emerging standards, a year from now you'll be able mix and

FEATURES									REDIRECTION				MODEM FEATURES					
Send fax within application	Capture Windows screens	Send fax within Windows	Background send/receive	Automatic polling	Automatic printing	Text editor	Graphics editor	Scanner utility	Epson	LaserJet	PostScript	Conversions	MNP-5 [1]	V.42	V.42bis	Dual phone plugs	Warranty	Reader service number
Y	Y	Y	Y	Y	Y	N	Y	Y	Y	[2]	[2]	PCX, TIFF	N	N	N	Y	1 year	715
Y	Y	Y	Y	Y	Y	N	Y	Y	Y	[2]	[2]	PCX, TIFF	N	N	N	Y	1 year	715
N	N	N	Y	N	N	Y	N	N	Y	Y	N	PCX, TIFF, WP	H	Y	Y [3]	Y	5 years	843
Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	PCX, WP	N	N	N	N	1 year	692
Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	N	PCX,TIFF	H	N	N	Y	1 year	844
Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	N	PCX,TIFF	H	Y	N	Y	1 year	844
Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	PCX,TIFF	H	Y	N	Y	1 year	844
Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	PCX,TIFF	H	Y	N	Y	1 year	844
Y	N	Y	Y	Y	Y	Y	N	Y	Y	N	N	PCX, TIFF, WP	H	Y	N	N	5 years	693
Y	N	Y	Y	Y	Y	Y	N	Y	Y	N	N	PCX, TIFF, WP	H	Y	N	N	5 years	693
Y	N	Y	Y	Y	Y	Y	N	Y	Y	N	N	PCX, TIFF, WP	N	N	N	N	5 years	693
Y	[2]	Y	Y	Y	Y	Y	[2]	[2]	Y	[4]	[4]	PCX, TIFF, WP	H	N	N	Y	5 years	694
Y	[2]	Y	Y	Y	Y	Y	[2]	[2]	Y	[4]	[4]	PCX, TIFF, WP	H	Y	Y	Y	5 years	694
Y	[2]	Y	Y	Y	Y	Y	[2]	[2]	Y	[4]	[4]	PCX, TIFF, WP	H	Y	Y	Y	5 years	694
Y	N	N	Y	Y	Y	N	Y	N	Y	N	N	PCX, TIFF	H	Y	Y	Y	2 years	695
Y	N	N	Y	Y	Y	N	Y	N	Y	N	N	PCX, TIFF	H	Y	Y	Y	2 years	695
Y	N	N	Y	Y	Y	N	Y	N	Y	N	N	PCX, TIFF	H	Y	Y	Y	2 years	695
[2]	N	[2]	[2]	N	Y	Y	[2]	N	Y	Y	N	PCX, TIFF, WP	H	Y	N	Y	1 year	696
Y	Y	N	Y	[2]	Y	Y	N	N	Y	Y	Y	PCX, TIFF [5]	H	Y	Y	Y	2 years	697
N	N	Y	Y	N	Y	Y	N	Y	Y	N	N	PCX, TIFF	S	N	N	Y	2 years	698
N	N	Y	Y	N	Y	Y	N	Y	Y	N	N	PCX, TIFF	S	N	N	Y	2 years	698
Y	Y	[2]	Y	Y	Y	N	N	[2]	Y	Y	Y	PCX, TIFF, WP	N	N	N	N	3 years	699
Y	Y	[2]	Y	Y	Y	N	N	[2]	Y	Y	Y	PCX, TIFF, WP	N	N	N	N	3 years	699
N	N	N	N	N	Y	N	N	[2]	Y	Y	Y	PCX, TIFF	N	N	N	N	3 years	699
Y	N	N	Y	N	Y	N	Y	Y	Y	Y	N	PCX, TIFF, WP	N	N	N	Y	2 years	700
N	N	N	Y	Y	Y	Y	N	N	Y	Y	N	PCX, TIFF, WP	S	N	N	Y	1 year	701
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	PCX, TIFF, WP	H	N	N	N	5 years	702
Y	N	Y	Y	N	Y	Y	N	N	N	Y	N	PCX, TIFF, WP	N	N	N	Y	5 years	703
Y	N	Y	Y	N	Y	Y	N	N	N	Y	N	PCX, TIFF, WP	H	Y	Y	Y	5 years	703
Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	PCX, TIFF, WP	S	N	N	Y	5 years	704
Y	Y	Y	Y	N	Y	Y	N	Y	N	Y	N	PCX, TIFF, WP	H	Y	Y	Y	5 years	704
Y	Y	Y	Y	N	Y	Y	N	N	N	Y	N	PCX, TIFF, WP	H	Y	Y	Y	5 years	704

TABLE CONTINUES ON FOLLOWING PAGES

match any fax board with any off-the-shelf fax program, just as you can do now with modems and communications packages. Almost all fax-modems now support either Class I or Class II, two similar protocols that provide standard command strings software applications can use to control fax boards. More fax-modems support Class II, which has yet to be approved, than the already established Class I. Class II promises faster background transfers than Class I, and will undoubtedly replace Class I. Once Class II is approved (probably this summer), expect more vendors to offer Class II–compatible software unbundled from boards. In the meantime, vendors have been implementing slightly different versions of Class II, so make sure the software publisher promises compatibility with the board you plan to buy.

Even today, you have some software choices. Most boards ship with a DOS fax package such as *BitFax*, *MTEZ*, or *QuickLink II*, which are also sold separately and support most major fax boards. *Windows* users can call on programs such as Alien's *FaxIt* and Delrina's *WinPro Fax* to capture and send *Windows* screens with just about every board on the market.

◆ **MASTERS OF MESSAGING** Most fax-modems offer advanced messaging features that you won't find on basic, low-cost fax machines. All the products listed here let you schedule unattended batch transmissions that will save money using night deliveries. They all also give you phonebook-style directories for keeping numbers organized, and let you broadcast a single fax to several different addresses.

Almost all fax-modems promise some form of background fax transfer, so you can be at work in another application while you're faxing. Many fax-modems provide fax polling—the capability to dial up other fax devices and download waiting faxes automatically. Fax polling also allows you to set up your own board to allow pickup by other polling fax devices.

◆ **CONVERTING TO FAX** All these packages let you convert ASCII text into fax format, but many also provide a conversion routine for *WordPerfect*, so *WordPerfect* users can skip the ASCII conversion step. If you want to include graphic images or scan in paper documents for faxing, look for a package that also converts PCX and TIFF graphics. Generally your scanner will come with an image editing program, so the simple graphics utilities bundled with most of these boards will probably go unused.

FAX-MODEMS CONTINUED

			STANDARD FEATURES		FAX
Manufacturer	**Product**	**Price**	**Bundled software**	**Class**	**CAS compatible**
MEGAHERTZ	C324FM	$429	MTEZ w/Express Fax	II	Y
	C424FM	$429	MTEZ w/Express Fax	II	Y
	T324FM	$429	MTEZ w/Express Fax	II	Y
OSMOS	COMPLUS 224ecc	$199	BitCom, BitFax	I	N
	COMPLUS 9624i	$139	BitCom, BitFax	II	Y
PRACTICAL PERIPHERALS	PM144FX V.32bis	$499	QuickLink II	II	N
	PM144FXSA V.32bis	$549	QuickLink II	II	N
	PM2400FX96	$209	QuickLink II	II	N
	PM2400FX96SA	$239	QuickLink II	II	N
SPECTRAFAX	Personal Link II	$499	PLink II	I	Y
SUNHILL DISTRIBUTING	Datatronics Discovery 2496VX	$248	abcFax	I, II	Y
	Datatronics Discovery 2496IIX	$282	abcFax	I, II	Y
SUPRA	SupraFaxModem Plus for Windows	$200	WinFax	I, II	N
	SupraFaxModem Plus for DOS	$170	FaxTalk Plus, Mirror	I, II	N
TECHNOLOGY CONCEPTS	Omni Link Fax/Modem	$249	DOS and Windows	II	Y
UDS MOTOROLA	FasTalk Fax32	$995	FaXit for Windows, FaxTalk Plus	I	N
	FasTalk Fax32 PC	$995	FaXit for Windows, FaxTalk Plus	I	N
	Sync-Up Fax32	$1395	FaXit for Windows, FaxTalk Plus	I	N
WESTERN DATACOM	432/v.42bis	$695	none	II	Y
ZOLTRIX	ZoFax Standard 96/24	$99	BitCom, BitFax	II	N
	ZoFax Enhanced 96/24	$149	BitCom, BitFax	II	N
ZOOM TELEPHONICS	FaxModem FC9624	$169	QuickLink II	II	N
	FaxModem FCV	$199	QuickLink II	II	N
	FaxModem FCV for Windows	$219	QuickLink II, WinFax 2.0	II	N

[1] S = software, H = hardware, N = none.
[2] Extra-cost option.
[3] TIFF and WP are extra cost.
[4] Windows only.
[5] Receive only.

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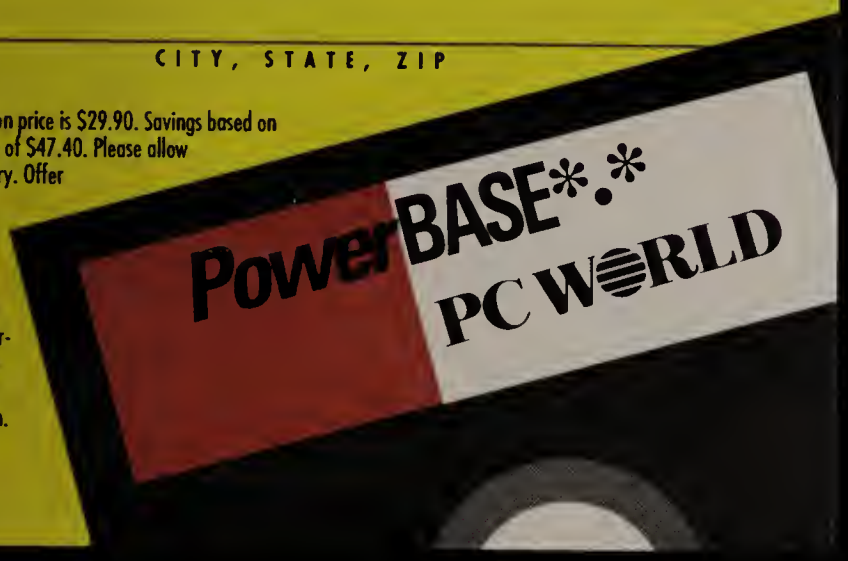

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Most people prefer to use printer redirection routines rather than step through a separate conversion process. Using memory-resident pop-up utilities or special printer drivers, you can redirect your Epson, LaserJet, or PostScript print output to fax format. Theoretically, redirection translates all the fonts and graphics that would otherwise print, but some conversions work better than others. Look for a product that lets you send a fax from inside the program—some let you convert the fax from a pop-up menu but make you exit the program in order to send it. *Windows* users can save a few bucks with a board that bundles *Windows* utilities such as *FaxIt* or *WinPro Fax*. You can

FAX GATEWAYS CUT COSTS ON NETWORKS

If you're a frequent faxer and timeliness is vital, there's no substitute for your own fax board. But if you and your assaciates send or receive only a few faxes a day, a fax gateway can pay aff. Fax gateways are LAN-based software packages that let a work graup share one or more fax boards installed in a file server or dedicated PC. Gateways are usually more cost effective than buying a fax board for each PC, and each user is spared the hassles of installing a fax board and making sure it doesn't conflict with other system camponents.

Fax gateway software resembles standalone fax software, letting each user prepare and address faxes and perform file conversions. But the programs often include additional features such as the ability to view and manipulate the fax queue in the same way a network print utility lets users view and alter the print queue.

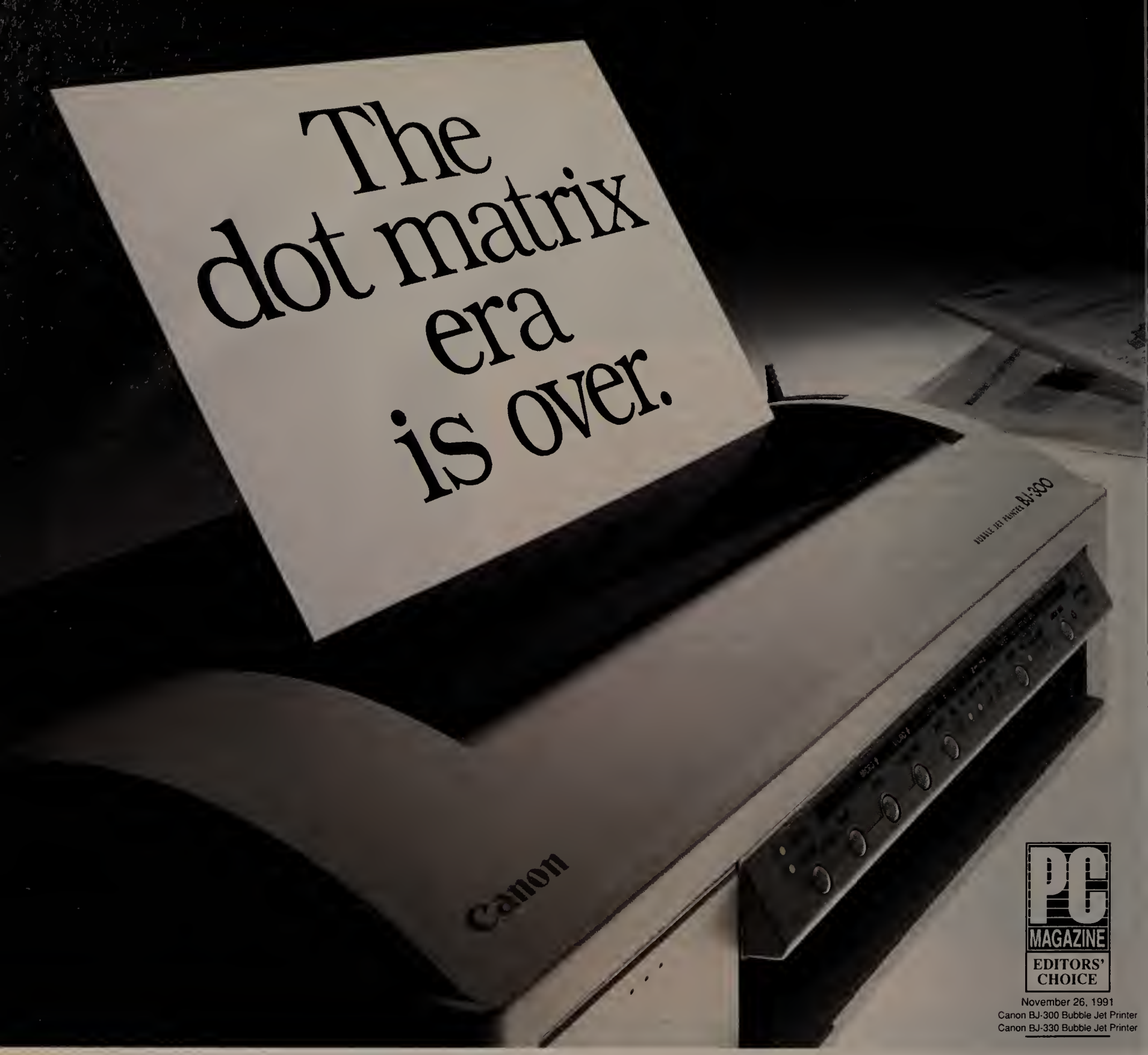
The main drawback to fax gateways is they lack a foolproof system for routing incoming faxes—in fact, most gateways require an operator to route faxes manually. Some depend on Direct Inward Dialing (DID), an extra-cost phone company service that essentially lets your fax gateway imitate a PBX switchboard. Other techniques include OCR systems that scan special ID codes printed on cover sheets or proprietary systems that add special extensions to fax numbers.

Fax gateways are sold by many of the board vendors listed here, including The Complete PC, Data Race, Gammalink, and Intel. Yau can also find vendors such as Alcom or OAZ Communications, as well as E-mail providers such as Latus.

FEATURES									REDIRECTION				MODEM FEATURES					
Send fax within application	Capture Windows screens	Send fax within Windows	Background send/receive	Automatic polling	Automatic printing	Text editor	Graphics editor	Scanner utility	Epson	LaserJet	PostScript	Conversions	MNP-5 [1]	V.42	V.42bis	Dual phone plugs	Warranty	Reader service number
Y	[2]	Y	Y	N	Y	Y	N	N	Y	N	N	PCX, TIFF, WP	H	N	N	N	5 years	705
Y	N	Y	Y	N	Y	Y	N	N	Y	N	N	PCX, TIFF, WP	H	N	N	Y	5 years	705
Y	N	Y	Y	N	Y	Y	N	N	Y	N	N	PCX, TIFF, WP	H	N	N	N	5 years	705
Y	Y	Y	N	N	Y	Y	Y	N	Y	Y	N	PCX, TIFF, WP	S	Y	Y	N	5 years	845
Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	PCX, TIFF, WP	[2]	[2]	[2]	Y	5 years	845
N	N	N	Y	N	Y	Y	N	N	Y	Y	N	PCX, TIFF, WP	H	Y	Y	Y	lifetime	706
N	N	N	Y	N	Y	Y	N	N	Y	Y	N	PCX, TIFF, WP	H	Y	Y	Y	lifetime	706
N	N	N	Y	N	Y	Y	N	N	Y	Y	N	PCX, TIFF, WP	N	N	N	Y	lifetime	706
N	N	N	Y	N	Y	Y	N	N	Y	Y	N	PCX, TIFF, WP	N	N	N	Y	lifetime	706
Y	[2]	[2]	Y	Y	Y	Y	Y	Y	Y	[2]	[2]	PCX [3]	H	N	N	Y	5 years	707
Y	Y	Y	Y	N	Y	Y	N	N	Y	Y	N	PCX, TIFF, WP	H	Y	Y	Y	1 year	708
Y	Y	Y	Y	N	Y	Y	N	N	Y	Y	N	PCX, TIFF, WP	H	Y	Y	Y	1 year	708
N	N	Y	Y	N	N	N	N	N	N	N	N	N	H	Y	Y	Y	5 years	709
N	n/a	n/a	Y	N	N	N	N	N	N	N	N	N	H	Y	Y	Y	5 years	709
Y	Y	Y	Y	N	Y	Y	N	N	Y	N	N	PCX, TIFF	S	N	N	Y	2 years	710
Y	Y	Y	Y	N	N	N	N	Y	[4]	[4]	[4]	PCX, TIFF	H	Y	Y	Y	2 years	711
Y	Y	Y	Y	N	N	N	N	Y	[4]	[4]	[4]	PCX, TIFF	H	Y	Y	Y	2 years	711
Y	Y	Y	Y	N	N	N	N	Y	[4]	[4]	[4]	PCX, TIFF	H	Y	Y	Y	2 years	711
Y	Y	Y	Y	Y	Y	Y	Y	N	[4]	[4]	[4]	PCX, TIFF	H	Y	Y	Y	1 year	712
Y	[2]	[2]	[5]	N	Y	Y	[2]	N	N	N	N	PCX, TIFF, WP	S	N	N	Y	1 year	713
Y	[2]	[2]	[5]	N	Y	Y	[2]	N	N	N	N	PCX, TIFF, WP	H	Y	N	Y	1 year	713
Y	Y	N	Y	N	Y	Y	N	N	Y	Y	N	PCX, TIFF, WP	N	N	N	Y	7 years	714
Y	Y	N	Y	N	Y	Y	N	[2]	Y	Y	N	PCX, TIFF, WP	H	Y	Y	Y	7 years	714
Y	Y	Y	Y	N	Y	Y	Y	[2]	Y	Y	N	PCX, TIFF, WP	H	Y	Y	Y	7 years	714

For more information about all products in this table, circle reader service no. 905.

The dot matrix era is over.



PC MAGAZINE
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November 26, 1991
Canon BJ-300 Bubble Jet Printer
Canon BJ-330 Bubble Jet Printer

No one will miss dot matrix printers, such a noisy bunch they were. But for a long time, they were the only way to produce decent quality output.

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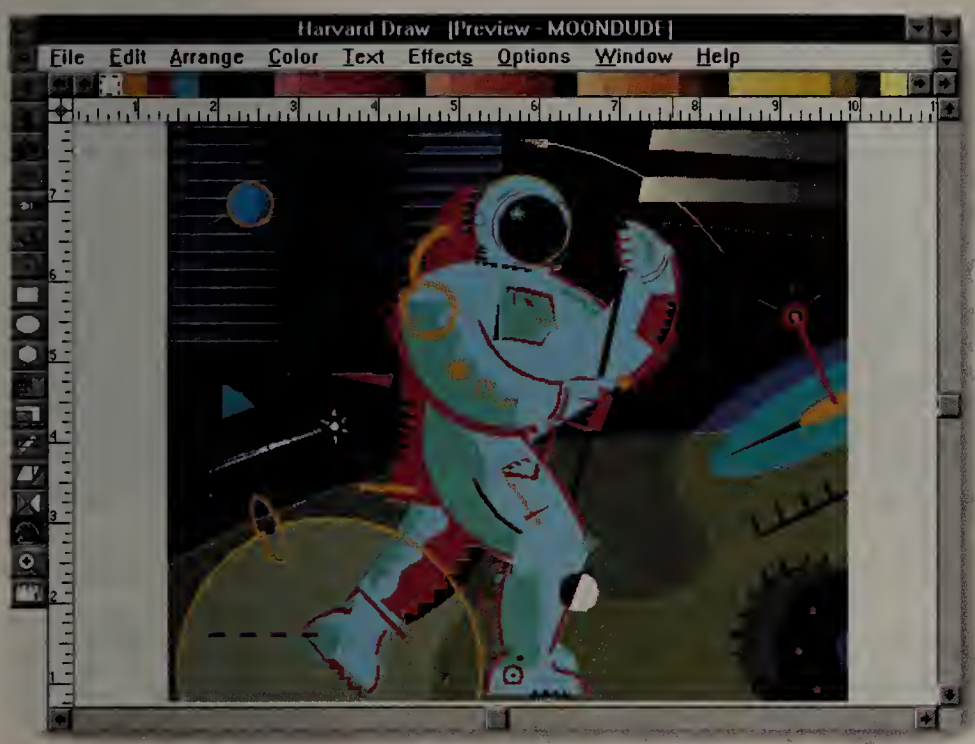
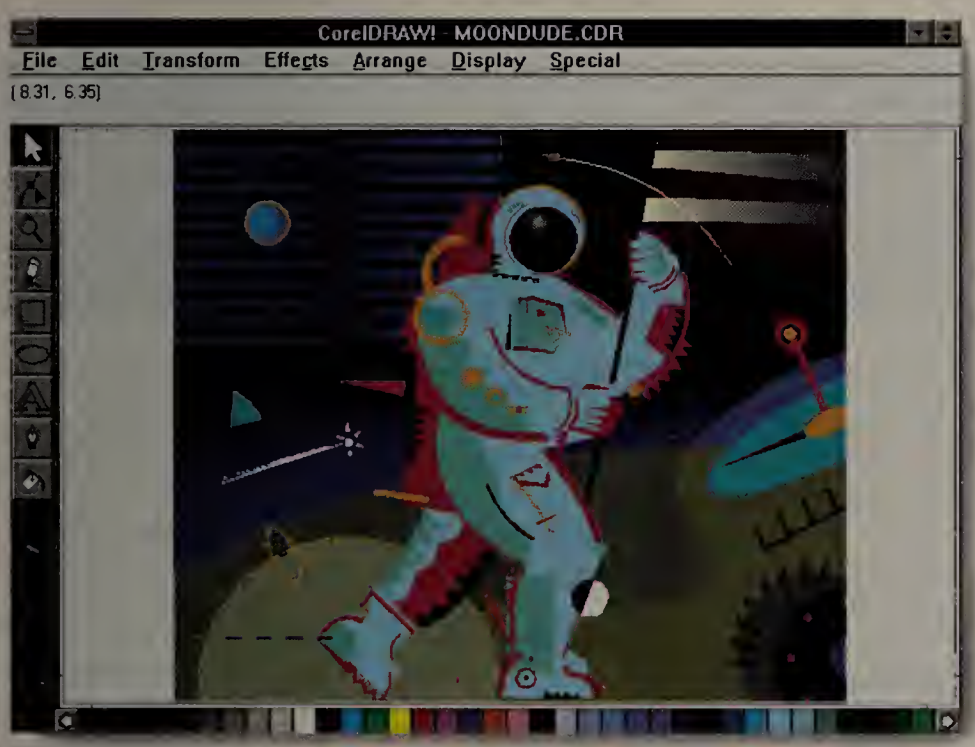


2 hours and 28 minutes on Harvard Draw.



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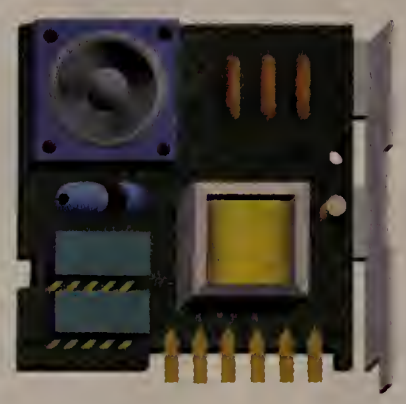
buy one of these programs separately, but make sure it fully supports the board you plan to buy.

◆ **MODEM TO MODEM** One 2400-baud data modem is generally the same as the next, with a big exception: the type of error correction and data compression protocols it supports. With MNP-5 error correction and data compression, you can almost double your effective data throughput when swapping files with another modem equipped with MNP-5. (Note, however, that some vendors implement MNP-5 in software, which gives you slower throughput than when it's placed in hardware.) Since all the MNP-5 modems include MNP-4 error



correction, you can also ensure your data goes across free of error. These days, the newer and more powerful V.42 error correction and V.42bis data compression are almost as widely used as MNP-5. With V.42bis, you can triple your effective throughput.

Data compression is important primarily if you plan to do a lot of file transfers between PCs or if you download big files from on-line services. However, the occasional on-line browser can probably get by without.

FUTURE FAXING

Fax technology is changing rapidly. In the next year, you'll see more fax/voice boards and innovative new fax applications, and fax-modems themselves will shrink. Laptop owners will soon be able to buy them in a credit card size, and some vendors are already selling notebook PCs with fax-modem chips built right into the motherboard. This year you will also see V.17 fax-modems that transmit data at 14,400 baud, but are still compatible with slower boards.

In the meantime, the basic fax board will continue to be a super value. Thanks to the stability of the Group III standard, you'll be using one to fax for many years to come. ●

Eric Brown is senior reviews editor and Susan Lusty an assistant editor for PC World.

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A few expert opinions:

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- Portable Office, *"The ZEOS Notebook...delivers astonishing value...sensational."*
- PC Computing, *"The ZEOS beats the Compaq."*
- Lotus, *"The ZEOS has it all—power, support, good looks."*

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The Gateway 2000 33-MHz 386VGA and AST Premium Exec 386SX/20VGA were the most aggressively priced desktop and portable PCs in the December survey by International Data Corporation.

Best-Sellers

Leading PCs sold through traditional computer channels

1. *IBM PS/2 Model 55 SX*
2. *Compaq LTE/286*
3. *IBM PS/2 Model 70 (20 MHz)*
4. *Compaq LTE 386s/20*
5. *NEC PowerMate SX, SX/20*
6. *IBM PS/2 Model 57 SX*
7. *Epson Equity 386SX*
8. *Compaq Deskpro 386n*
9. *IBM PS/2 Model 35 SX*
10. *AST Bravo/Premium 386SX*

IBM and Compaq shared the top dealer sales positions with NEC, Epson, and AST, according to Storeboard/Computer Intelligence's November survey.

BARGAINS OF THE MONTH

Over the Counter

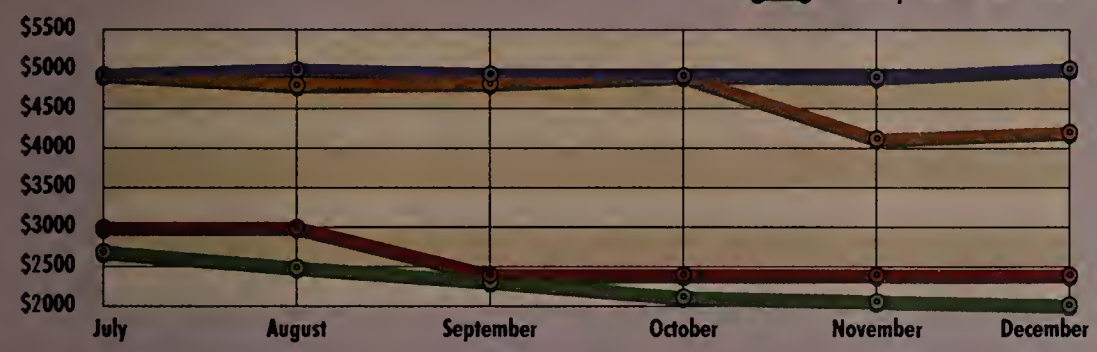
What you pay at retail stores for popular PCs

	Configuration				National				
	Speed (MHz)	RAM (MB)	Hard disk (MB)	Video adapter	List	Average	Boston	Chicago	Dallas/Ft. Worth
80386SX-based desktop PCs									
AST Bravo 386SX/20	20	2	40	VGA	$1695	$1393	$1357	$1254	$1497
Compaq Deskpro 386s	16	2	40	VGA	$2299	$1885	$1875	$2054	$1848
Compaq Deskpro 386s/20	20	2	60	VGA	$2599	$2131	$2130	$2183	$2053
Dell System 320 SX	20	2	40	VGA	$1400	$1400	$1400	$1400	$1400
IBM PS/2 Model 35 SX-043	20	2	40	VGA	$2525	$1942	$1793	$2045	$1919
IBM PS/2 Model 55-041	16	4	40	VGA	$2745	$2051	$2033	$2178	$1951
NEC PowerMate SX/20i	20	2	60	VGA	$2049	$1641	$1593	$1605	$1533
80386DX-based desktop PCs									
AST Premium II 386/33	33	4	210	VGA	$3795	$3107	$3001	$3036	$3208
Compaq Deskpro 386/33L	33	4	120	VGA	$6199	$5011	$5088	$5331	$5166
Dell System 333P	33	4	100	VGA	$2400	$2400	$2400	$2400	$2400
Epson Equity 386/25 Plus	25	2	100	VGA	$3199	$2464	$2345	$2322	$2457
Gateway 2000 33-MHz 386	33	4	200	VGA	$2020	$2020	$2020	$2020	$2020
IBM PS/2 Model 70-A61	25	4	160	VGA	$5475	$4207	$4167	$4216	$4174
Tandy 4033 LX	33	2	105	VGA	$4398	$4398	$4398	$4398	$4398
80486SX-based desktop PCs									
ALR BusinessVEISA	20	5	120	n/a	$3495	$2898	$2813	$2863	$2763
AST Premium II 486SX/20	20	4	80	VGA	$3495	$2849	$2574	$2796	$2813
IBM PS/2 Model 90XP-OH9	25	4	160	XGA	$6545	$5032	$5044	$5192	$4746
80486DX-based desktop PCs									
AST Premium II 486/33	33	4	210	VGA	$5495	$4495	$4381	$4429	$4575
Compaq Deskpro 486/33M	33	4	340	VGA	$7199	$5860	$5636	$5939	$5751
IBM PS/2 Model 90XP-OKF	33	8	400	XGA	$12,495	$9687	$9107	$9913	$8809
NEC PowerMate 486/33e	33	4	300	none	$6349	$5077	$4953	$4973	$5065
Portables/laptops									
AST Premium Exec 386SX/20	20	2	40	VGA-LCD	$2395	$2108	$2168	$1979	$2160
Compaq LTE/286	12	640K	20	CGA-LCD	$1949	$1474	$1498	$1654	$1171
Compaq LTE 386s/20	20	2	30	VGA-LCD	$3599	$2734	$3037	$3138	$3184
Dell System NX20	20	2	60	VGA-LCD	$2499	$2499	$2499	$2499	$2499
IBM PS/2 Model L40 SX	20	2	60	VGA-LCD	$3645	$2908	$2806	$2880	$2820
NEC UltraLite 286F	12	1	20	CGA-LCD	$2199	$1593	$1651	$1744	$1564
TI TravelMate 2000	12	1	20	VGA-LCD	$1499	$1293	$1271	$1497	$1756
Toshiba T2000SX	16	1	40	VGA-LCD	$2849	$2711	$2730	$3100	$2971
Toshiba T2000SXe	20	2	60	VGA-LCD	$3699	$3259	$3326	$3674	$3611

From an IDC survey of more than 180 computer dealers in eight metropolitan areas. Figures based on at least four price quotes for each machine. Prices are based on manufacturer's standard configuration without monitor.

Trend Line: 386DX Desktops

National average street price for selected models over six months



Quick! Can you tell from the sticker price which of these systems are sold by dealers and which are sold direct? IBM and Compaq have been touting cheaper PCs recently but haven't exactly slashed sticker prices. Among 33-MHz 386DX desktops, Dell and Gateway models sell for about half the price of those competitors. It's hard to imagine this situation continuing through 1992.

Metropolitan

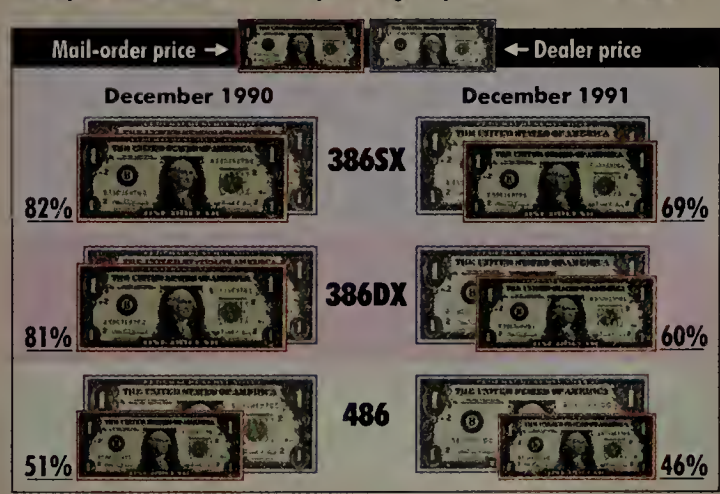
Los Angeles	Miami/ Ft. Lauderdale	New York	San Francisco Bay Area	Washington, D.C.
$1419	$1430	$1387	$1352	$1342
$1765	$1782	$1940	$1881	$1897
$1995	$2076	$2176	$2188	$2129
$1400	$1400	$1400	$1400	$1400
$2020	$1976	$1843	$1789	$2073
$2196	$2198	$1993	$1902	$2111
$1676	$1632	$1597	$1578	$1651
$3179	$3201	$3026	$3139	$3114
$4758	$4836	$4681	$5218	$5114
$2400	$2400	$2400	$2400	$2400
$2514	$2421	$2396	$2294	$2312
$2020	$2020	$2020	$2020	$2020
$4380	$4243	$4001	$3868	$4476
$4398	$4398	$4398	$4398	$4398
$2796	$2849	$2830	$2907	$2955
$2901	$2948	$2752	$2894	$2862
$5236	$5073	$4924	$4665	$5393
$4602	$4634	$4217	$4546	$4502
$5525	$5579	$5974	$6059	$5939
$9996	$10,184	$9387	$8996	$10,137
$5185	$5130	$4839	$4889	$5079
$2003	$2113	$2057	$2369	$2165
$1496	$1511	$1503	$1269	$1608
$2807	$2789	$2048	$3014	$2969
$2499	$2499	$2499	$2499	$2499
$2916	$3056	$2839	$2773	$3020
$1756	$1715	$1287	$1667	$1469
$1834	$1358	$1147	$1277	$1458
$2943	$2884	$2218	$2570	$2787
$3601	$3489	$2869	$3113	$3152

PC Futures: Giants Losing Ground

The Gateway 2000 33-MHz 386 is the desktop Bargain of the Month, while the AST Premium Exec 386SX/20 is the portable Bargain of the Month.[1] The best-seller list, which typically changes only very slowly, highlights the turmoil in the market this month: Traditional leaders IBM and Compaq still dominate the list, but AST, Epson, and NEC have elbowed their way in. Mail-order vendors such as Dell and Gateway 2000 are also carving away sales from the giant suppliers, with pricing as their largest advantage. Several times in 1991, IBM and Compaq cut sticker prices substantially, but their nimbler competitors stayed well ahead of them in the price wars. Both IBM and Compaq have reorganized, and both promise (again) to make much more aggressive pricing moves soon. Overall, U.S. PC sales are expected to stay flat this year, which will heighten the competition and give customers ever-better bargains.

Mail-Order PCs Get Cheaper Faster

Street price of mail-order PCs as a percentage of price of PCs sold via dealers



While major PC suppliers cut prices throughout 1991, mail-order vendors such as Dell and Gateway 2000 stayed well ahead, according to a study of selected "Over the Counter" models (see chart at left). In late 1990, a 386SX desktop from a mail-order supplier cost an average of 82 percent of the price of a similar PC sold via dealer, but a year later that figure had dropped to 69 percent.

[1] Bargains of the Month are determined by adjusting prices on PCs of a given class for standard memory and storage, then finding which PC compares best.

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A few expert opinions:

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- Lotus, *"The ZEOS has it all—power, support, good looks."*

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Groupware

BY ALAN KAPLAN, ROBERT LAURISTON, AND STEVE FOX

You need to set up a meeting, and the client wants to know now when you and your team can be there. There's no time for phone tag or the E-mail waiting game. So you sprint down the hall to Eric's office. Today at 10, 1, or 4:30 would be fine, he says. Bill's in an all-day meeting, and his secretary says he won't be available until tomorrow. Allison isn't in, and she doesn't answer your page. Tom's out of town, but he should be back Wednesday. You throw up your hands and consider a career change.

Sound familiar? Not if your company has a group scheduler. This time-saving program lets you check the network to view Eric's, Bill's, Allison's, and Tom's upcoming appointments. In seconds you know exactly when to schedule the meeting so everyone can attend.

Group scheduling is just one of the many wonders of the rapidly growing groupware software category. Groupware's objective is to share useful information on the network that would otherwise stay locked in individual PCs or in peoples' heads, and to automate group tasks that would usually require meetings or circulating hard copy. With a group document editor, for example, each team member can contribute sections to a working document on line while making comments and suggestions on everyone else's input—a far speedier tack than using little yellow tags and keying in changes. Other applications for group collaboration include contact managers (essentially shared address data bases); project managers; and on-line, real-time conferencing systems. Almost all these applications work in conjunction with the mother of all groupware packages—electronic mail.

Truly sophisticated programs such as the *Windows*-based *Lotus Notes* (see "Notes Leads the Way") take groupware to even greater heights. Much like users of electronic bulletin board services, *Notes* users work on group documents stored in constantly updated data bases on the server. They routinely build automated "views" of the documents they want to see—based on date created, author, subject, or keyword, for example—so they aren't deluged with unnecessary information. Some *Notes* users report that the package takes over as the primary application for the work group.

Groupware fans wax ecstatic over their newfound productivity. The old work model—everyone sitting at a PC, duplicating everyone else's work and shooting messages from point A to point B—is holding us back. Applications suited to the work patterns of the group can eliminate wasted effort by taking advantage of work already completed. At the same time, we can have instant access to just the information we need to make better decisions, plot better strategies, and call fewer meetings.

No network office can live without electronic mail. Once you discover group scheduling, editing, and contact management, you may not be able to live without groupware, either.

BILL RUSSELL

BEFORE YOU TAKE THE PLUNGE

Groupware isn't like spreadsheets, where all products do basically the same thing. In fact, no two groupware products are alike, which is fortunate because no two work groups are alike either. To be effective, however, groupware packages must share one trait: ease of use. If even one member of the group doesn't participate, a critical link in the communications chain can be severed. So from the lowliest E-mail–enabled group scheduler to the ambitious *Notes*, which lets users communicate, manipulate, and analyze unstructured data, the tools must be intuitive, easy to learn, and easy to use.

Since any software that allows two or more people to collaborate over a network can be considered groupware, there's a considerable diversity of features between packages. However, you should consider a few key issues before making any purchase:

E-MAIL. Even in the collaborative universe of groupware, point-to-point electronic mail is still the most common function, so it's important to look at the way a package sends and receives messages. At the very least, a groupware program should let you forward and reply to messages, send a carbon copy, and distribute to a list. It should also provide some kind of built-in text editor, import and export text files, and attach formatted files to messages. Look for extras like notification that your message has been read, electronic "while you were out" forms, and a file management feature that stores mes-

sages in folders. Some packages let you save message drafts or view a message in one window while replying in another. *Notes*, *OfficeMinder*, *Right Hand Man*, and *WordPerfect Office* let you swap messages without having to leave your application.

CONNECTIVITY. If you rely on fax, modem, or LAN gateways to communicate with the outside world, you should consider a package like *Higgins Mail*. With a remote version, you can dial in to your desktop PC while you're on the road. Gateways to MHS, which allow you to connect with other LANs, are a plus.

SCHEDULING. If group scheduling is what you're after, look for a package that lets you view all your compadres' avail-

NOTES LEADS THE WAY

When people talk groupware these days, they're usually talking *Lotus Notes*. That's because *Notes* gives users almost unlimited flexibility in sharing information across an organization. As with basic E-mail, *Notes* users can send messages, but that's just the starting point. For example, when a *Notes* user creates a document, he places it in a data base residing on the server. Authorized members of the user's group can view, respond to, or modify any document within that data base, eliminating hard-copy routing, repeated face-to-face meetings, and complex data base queries.

Without any programming, *Notes* users can design their own data bases, assuring themselves and team members of access to up-to-date information and a forum for debate and collaboration. The creator of a data base controls who has access to it.

Consider this example. You've been asked to assemble a team to evaluate your company's health care benefits. You create one data base called Health Discussions, another called Health Policy (containing the company's employee benefit manual), and a third called Rulings (containing archival listings and summaries of benefits-related court decisions). You E-mail invitations to co-workers to join the group and tell them where the new data bases are located. Group members accepting the invitation then place icons representing those data bases in "folders" on their desktops. Whenever group members want to initiate a discussion, they can open the Health Discussions data base and begin typing.

For companies with multiple-server networks, *Notes* periodically copies data bases to servers in other locations, updating information in the process. *Notes'* devotees are particularly enamored of the program's customizability. Users can personalize their own "view" so that when they select a data base, they see a listing of documents by name, date, keyword or other criteria of their choice. And since these documents are stored on servers instead of in individual E-mail files, team members can use different views to track the progress of a project.

Notes, a *Windows* product, runs on all major PC networks but it requires a server running IBM OS/2. If bought from IBM or Lotus the minimum order is 200 workstations for $62,500, but resellers offer *Notes* in smaller quantities and for less per station. —Steve Fox

A Day in the Life of Notes

Vaccustat Corporation is a midsize manufacturer of cleaning appliances with a customer service center in Nebraska, an R&D facility in Texas, and corporate offices in Chicago. They rely heavily on an independent ad agency based in Los Angeles, and all four offices are hooked up via Notes.

CHICAGO, 1:30 P.M.

Ellen sends E-mail to Zachary, Vaccustat's Chicago-based VP of manufacturing, mentioning the problem and suggesting he review the foregoing discussions in the Problems and Engineering data bases. Zachary checks the discussions in question.

2:15 P.M.

Zachary asks Ellen and George by E-mail to update their departments' budget spreadsheets—held in the Budgets data base—to reflect possible new expenses associated with redesigning the product or redoing the commercial.

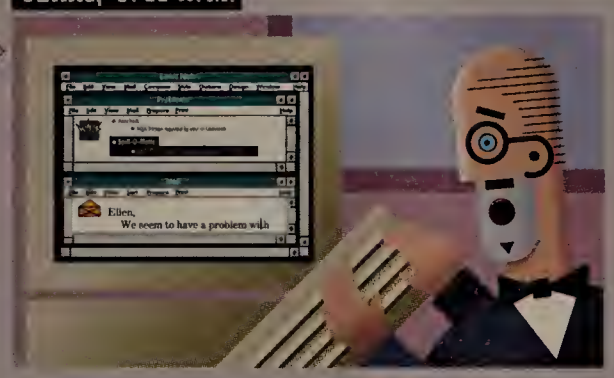
able hours; a good scheduler should alert you to conflicts. The group scheduler should be integrated with E-mail so you won't have to update your personal scheduler manually when accepting an invitation or confirming a meeting. Ideally, your package should also include a personal scheduler.

PRODUCTIVITY. Many groupware packages offer extras such as an electronic Rolodex, autodial of stored phone numbers, and file managers like the *XTree* DOS shell. Products like *Together* tackle the productivity issue by allowing users to organize activities into customized groups, so one screen might contain icons for all the applications, files, and reference materials needed for a specific task.

NEBRASKA, 9:00 A.M.

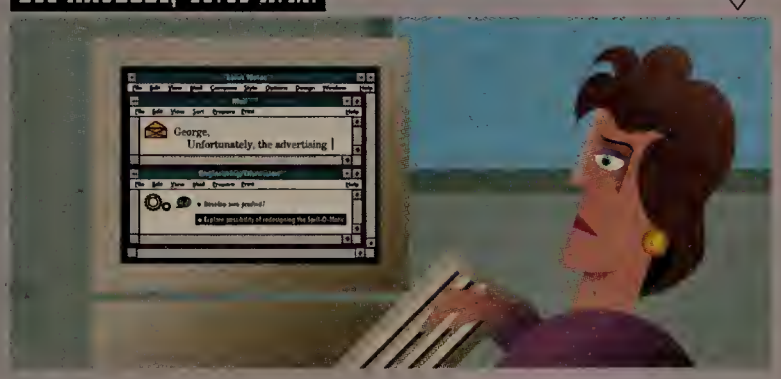
An irate customer calls Voccustot's 800 number to complain that the company's Spill-O-Matic won't get molasses out of her shag rug, as advertised on TV. Harvey, a phone support clerk in Nebraska, fills out a Notes call-tracking form and checks the Notes Complaints data base to see if anyone has reported similar problems. Finding no prior reports, he promises the customer he'll get back to her and posts a message in the Problems data base requesting a solution.

TEXAS, 9:45 A.M.



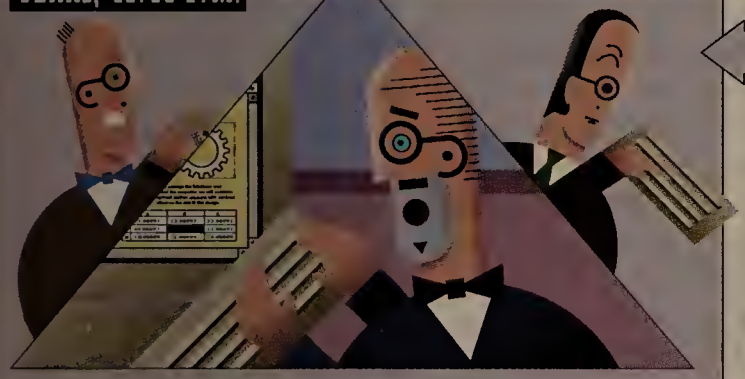
George, a Voccustot engineer in Texas, checks the phone support department's Problems data base. He responds within the data base that the Spill-O-Matic wasn't designed to remove molasses. He also E-mails the advertising department in Los Angeles, asking them to join the discussion.

LOS ANGELES, 10:15 A.M.



Advertising account exec Ellen explains to George by E-mail that the ad agency, in an attempt to add drama to the TV commercial, changed the spill from cola to molasses. She initiates a discussion—marked urgent—within the Engineering data base, asking if the appliance can be modified to handle viscous liquids.

TEXAS, 12:20 P.M.



George and the other Spill-O-Matic engineers confer within the Engineering data base on the mechanics of the redesign. They finally conclude that they can add molasses capability—but it will be expensive. George E-mails this information to Ellen.

4:00 P.M. **4:15 P.M.** **4:35 P.M.** **LATER**

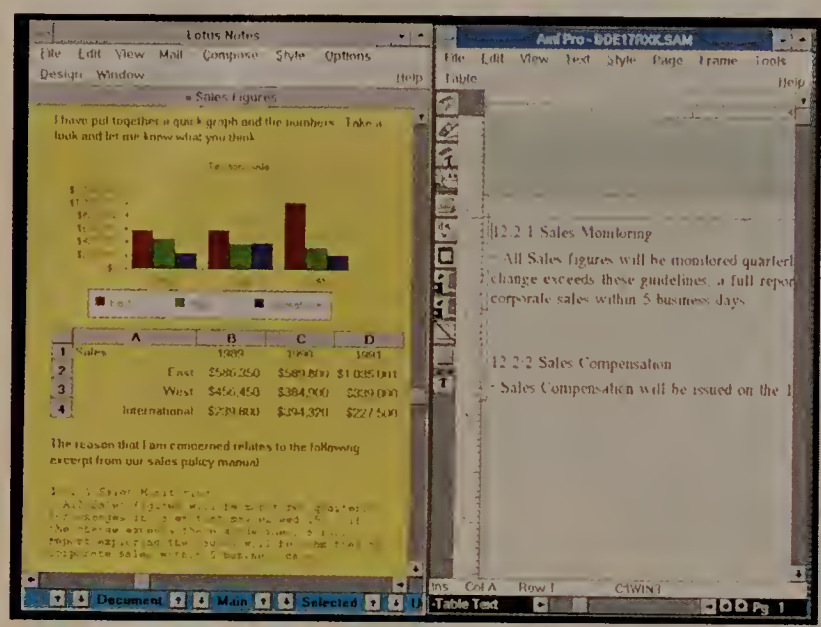
After examining the revised budgets, Zachary opts for the redesign and sends George an E-mail message authorizing him to start work on the project. Zachary E-mails Harvey to send the customer a refund and a Voccustot gift certificate. He closes the discussion in the Problems data base by explaining how support staff should handle customer molasses complaints until the redesign is completed.

The following 28 programs represent a sampling of groupware at its best. Given the vast number of packages that call themselves groupware, any listing of available programs is bound to be controversial. Conventional E-mail programs, for instance, certainly perform fundamental groupware functions. But for an E-mail package to wear the groupware label, it must offer at least scheduling or some other group application.

ACTION PLUS In its network incarnation, this contact-management package lets you share a data base of names and addresses and includes simple LAN messaging. For the next upgrade, look for E-mail basics like file attachments and ASCII import and export. Action Plus Software, 935 East 7220 South, Suite D108, Salt Lake City, UT 84047; 801/255-0600. List price: $1495 per server. *Reader service no. 607*

BEYONDMAIL 1.1 An E-mail package with brains, *BeyondMail* lets you automate message management. For example, you can build a filter that will forward to your MIS department any message from personnel that contains the word *network*, then file the message in a folder. Beyond, Inc., 38 Sidney St., Cambridge, MA 02139; 800/845-8511. List price: 10-node license $995 per server; 5-node expansion pack $495, 20-node expansion pack $1695. *Reader service no. 608*

BRAINSTORM 2.01, WILDCAT 3.02 Users of *Brainstorm*, a BBS-style LAN conferencing system with modest E-mail capabilities, create "topics" to which invitees may respond. *Wildcat* offers similar topic-oriented messaging, plus remote user access with any communications package. MCI Mail, CompuServe, BIX, fax, and MHS gateways are also available. Mustang Software, Inc., P.O. Box 2264, Bakersfield, CA 93303; 800/999-9619. List price: Brainstorm $349 per server for 25 users, $699 per server unlimited; Wildcat 1 line $129, 2 to 10 lines $249, 11 to 250 $499, each gateway $299. *Reader service no. 609*



Lotus Notes' support for Dynamic Data Exchange lets you link a Notes document with a document created in Ami Pro or other applications.

THE COORDINATOR II 2.2 Version 2.2 of this MHS-compatible E-mail and group-scheduling package divides messages into seven types—from informal notes to speculative what-ifs—and provides a "conversation manager" to organize, sort, link, and track your communications. The flexible scheduling module offers multiple views, updating options, and automatic linking of appointments and reminders. Da Vinci Systems Corp., P.O. Box 17449, Raleigh, NC 27619-7449; 800/328-4624. List price: 1 user $600, 10 users $1800, 30 $3000, 100 $7500. *Reader service no. 610*

CA-FORCOMMENT This document review program allows group members to collaborate on documents, simultaneously editing, reviewing, and responding to team members' input. *ForComment* tracks each reviewer's comments and consolidates all input into a single annotated copy. Computer Associates Int'l Inc., 1 Computer Associates Way, Islandia, NY 11788-7000; 512/342-6000. List price: 20 users $1695, 30 $2495. *Reader service no. 611*

GROUPSYSTEMS 4.04 Designed for on-line meetings, GroupSystems is a collection of brainstorming, outlining, and consensus-building tools that allow users to record comments, suggestions, vote casting, and ratings. GroupSystems records all participants' input anonymously and simultaneously. Ventana Corp., 1430 E. Fort Lowell, Ste. 301, Tucson, AZ 85719; 800/368-6338, 602/325-8228. List price: basic toolbox $42,500, advanced tools additional $15,000. *Reader service no. 612*

HIGGINS 2.4 Electronic mail, the backbone of this popular product, is sold as a standalone component or integrated with group scheduling, calendar management, expense reports, and other office functions. An optional module, *Higgins Remote*, addresses the needs of out-of-office laptoppers, while gateways to MHS, fax, and elsewhere take care of connectivity. Enable Software, 1150 Marina Village Pkwy. #101, Alameda, CA 94501; 510/865-9805, 510/521-9779 (fax). List price: server kit $695, 4 users $349, 12 $995, 20 $1495, Higgins Remote $395, fax gateway $995, MHS gateway $495. *Reader service no. 613*

LOTUS NOTES 2.1 Release 2.1 of Lotus's sophisticated E-mail, document management, and conferencing system includes support for DDE and embedded documents, the capability to handle larger images (such as scanned TIFF files), and better remote-user support. Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 800/872-3387. List price: $495 per unit. *Reader service no. 614*

MAILMAN, WORKMAN MailMan, a slick *Windows* front end for standard E-mail systems, concentrates on storing and forwarding messages among users and applications. It lets users create, view, and manage messages as well as launch other applications from within E-mail. *WorkMan* hooks up to E-mail packages to automate work flow across an enterprise. A *Windows* product, it classifies and organizes information into "forms," and routes those forms through the stages of work flow and acts on them. Reach Software Corp., 330 Potrero Ave., Sunnyvale, CA 94086; 408/733-8685, 408/733-0482 (fax). List price: MailMan $995 for 20 users, $1995 per server unlimited; WorkMan $2495 for 1 to 5 users, each additional 5 users $1495. *Reader service no. 615*

NETWORK SCHEDULER II 1.5C This product's strengths are its individual, group, and resource scheduling capabilities. Used with any MHS-compatible E-mail program, cc:Mail, or Microsoft Mail, the DOS-based Network Scheduler offers an add-on Windows interface. It can also operate without E-mail. Powercore, Inc. P.O. Box 756, Manteno, IL 60950-0756; 800/237-4754, 815/468-3737. List price: 5 users $395, Windows interface $595 per file server, 5 users (non-E-mail) $195, 5-user

expansion module $195. *Reader service no. 616*

OFFICEMINDER 1.6 The latest version of this memory-resident E-mail, group scheduling, and project-tracking bundle beefs up its E-mail capabilities—with public mail folders, message archiving, and automatic mail forwarding. Century Software, Inc., Woodridge Technology Park, 310 N. Wilson Ave., Hartford, WI 53027; 800/437-4492, 414/673-4424. List price: 1 to 5 users $395, 6 to 20 users $795, 21 to 100 $1495, unlimited use $2495. *Reader service no. 617*

OFFICEVISION/2 LAN SERIES This office-automation package offers a text editor, decision support, scheduling, and E-mail. When used in conjunction with *Lotus Notes* its E-mail capabilities are greatly enhanced. IBM Corp., Old Orchard Rd., Armonk, NY 10504, 800/426-2468. List price: 1 user (OS/2) $350, each additional $265, 1 user (DOS) $210, each additional $175. *Reader service no. 618*

OFFICE WORKS This E-mail and group-scheduling package includes a DOS shell and a shared address-book data base plus LAN-to-LAN communications, MHS and X.400 gateways, and remote dial-in. Data Access Corp., 14000 S.W. 119 Ave., Miami, FL 33186; 800/451-3539. List price: $495 per server for 6 users, $895 for 20, $1395 for 50, $1995 unlimited; LAN-to-LAN or MHS gateway $695, X.400 $8000. *Reader service no. 619*

ONTIME FOR WINDOWS NETWORK *OnTime* concentrates on scheduling. It began as a personal time manager so the group version has strong single-user scheduling. Campbell Services, Inc., 21700 Northwestern Hwy. #1070, Southfield, MI 48075; 800/345-6747. List price: 3 users $356, 100 $4680. *Reader service no. 620*

PARADIGM VII This powerful personal contact manager focuses its attention on corporate marketing. It includes E-mail and a multiuser calendar, along with a flexible data base with extensive user-defined categories and cross-reference indexing functions. Chesapeake Computing, Inc., 8401 Corporate Dr., Metroplex I #560, Landover, MD 20785; 800/899-2255. List price: 4 users $2495, each additional 5users $1995. *Reader service no. 621*

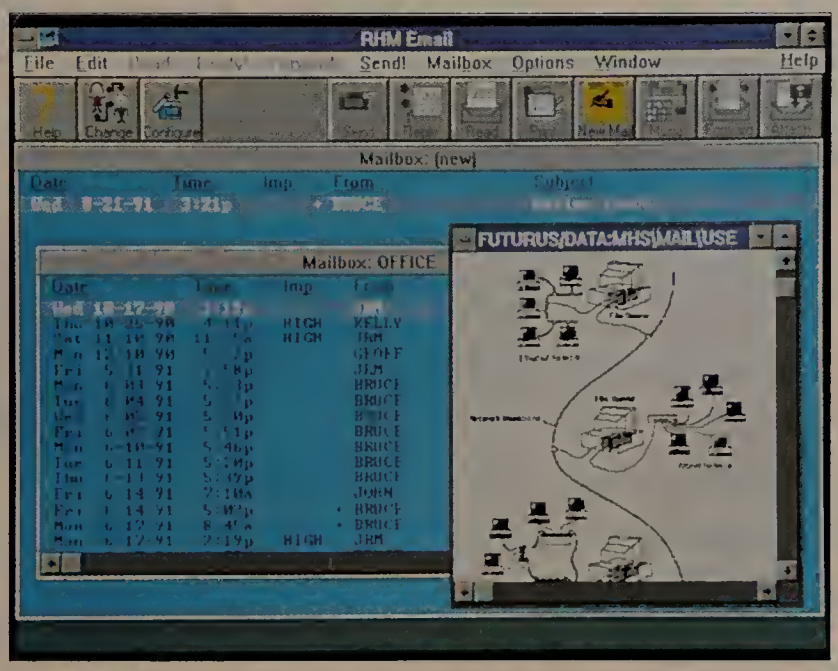
Groupware isn't like spreadsheets, where all products have essentially the same function. In fact, no two groupware products on the market are the same.

PARA-MAIL 2.17 An E-mail package with loads of extras, *Para-Mail* has a fax gateway and a built-in phone memo center for accessing voice mail. The package, with provisions for 10 active notepads and up to 64 attached files, runs under Novell MHS version 1.5 or earlier. Paradox Development Corp., 6215 Ferris Sq. #190, San Diego, CA 92121; 619/535-0765, 619/535-0785 (fax). List price: 20 users $1495, 100 $3495, single-user remote $295. *Reader service no. 631*

POLARIS PACKRAT 4.0 FOR NETWORKS The network version of this popular *Windows* personal information manager features group scheduling and simple messaging. Polaris Software, 17150 Via Del Campo, #307, San Diego, CA 92127; 800/722-5728, 619/674-6500. List price: first 3 users $695, each additional user $150. *Reader service no. 630*

QED OFFICE 2.0 An electronic mail package with all the trimmings, this *Windows* program handles contact management, group and personal scheduling, and document processing. Strategic Marketing Associates, 2785 Pacific Coast Hwy. #251, Torrance, CA 90505; 310/378-7632, 310/378-8285 (fax). List price: 5 users $595, 20 $1795. *Reader service no. 622*

RIGHT HAND MAN FOR WINDOWS, RIGHT HAND MAN II These *Sidekick*-style bundles of memory-resident productivity (see this month's Product Outlook) feature E-mail and group scheduling. Both packages, which can work side-by-side on the LAN, have an on-line chat function, links to remote LANs and MCI Mail, and can manage faxes. Futurus Corp., 211 Perimeter Center Pkwy. #910, Atlanta, GA 30346; 800/327-8296, 404/392-7979. List price: Right Hand Man II or Right Hand Man for Windows $495 for 5 users, $1995 for 25, $7980 for 100. *Reader service no. 623*



A robust E-mail system, with numerous gateways and capacity for multiple mailboxes, is at the heart of Futurus' Right Hand Man for Windows.

SUPEROFFICE 2.02 This single- or multi-user data base features a calendar, customer contact data, a follow-up function that records customer transactions, and a report generator. SuperOffice Corp., One Cranberry Hill, Lexington, MA 02173; 617/674-1101. List price: 1 to 5 users $1695, 6 to 10 $2695, 11 and up $195 per user. *Reader service no. 624*

SUPERTIME 1.1 Designed to automate and organize daily activities over the LAN, *SuperTime* combines a group scheduler, contact directories, a project and task manager, and E-mail. SuperTime, Inc., 2025 Sheppard Ave. E #2206, Willowdale, Ontario, Canada M2J1V7; 416/499-3288, 416/499-6462 (fax). List price: 1 user $295, 1 user/multiresource $495, 4 users $695, 8 $995, 16 $1695, 25 $2495, 50 $4795, 75 $6995, 100 $8995, each user after 100 $85. *Reader service no. 625*

SYZYGY 2.0 Multiproject tracker *Syzygy* is aimed at both individuals and groups. Group members exchange information through "workmaps"—standardized, consolidated forms that use *Syzygy*'s own file format. An MHS-based E-mail module is also available. Syzygy Development, Inc., 5555 Triangle Pkwy. #320, Norcross, GA 30092; 404/662-

5362. List price: 10 users $1695, each additional 5 users $695, LAN-mail module $395. *Reader service no. 626*

TOGETHER 1.0 A work flow–management package, *Together* lets users organize tasks into multiple saved "desktops" that can include icons for shared and private documents, E-mail, spreadsheets, word processors, and other applications. Color coding indicates project status; red, for example, signifies that work is overdue. *Together* works with other groupware products, including *Notes*. Coordination Technology, Inc., 35 Corporate Dr., Trumbull, CT 06611; 800/292-7755, 203/268-4045. List price: server component $4995, 5 users $1495. *Reader service no. 627*

ENTERPRISE WHO-WHAT-WHEN 1.1 This project-management package—designed to coordinate and track progress of group activities—supports personal and group scheduling, simple messaging, and document transfer. Daily calendar entries automatically build Gantt charts or time lines. Chronos Software Inc., 555 De Haro St. #240, San Francisco, CA 94107; 415/206-0580, 415/206-0587 (fax). List price: server pack with 6 workstations $695, additional 5 users $495, additional 20 $1495. *Reader service no. 628*

In the new business model, the work group as SWAT team, the group is built to perform a single task. It's born, does a job, then dissolves.

WORDPERFECT OFFICE 3.02 An electronic-mail package and scheduler, *WordPerfect Office* sports several desktop utility programs, including a flat-file data base, a macro editor, and a menuing system. Options include MHS, MCI Mail and other gateways, as well as *WordPerfect Connections* for hooking up to multiple LANs. WordPerfect Corp., 1555 N. Technology Way, Orem, UT 84057; 800/451-5151, 801/225-5000. List price: 5 users $495, 20 $1495, WordPerfect Connections and gateways $495 each. *Reader service no. 629*

BUSINESS AS USUAL?

The list of available groupware products grows daily, chiefly because American business is discovering so many new ways in which these products provide a competitive edge. Indeed, groupware's flexibility supports a new trend in business: the work group as SWAT team. In this model, the work group is built to perform a single task or produce a specific deliverable. It's born, does a job, and then dissolves. Many businesses are currently experimenting with this structure because it lets them respond quickly to shifting market conditions—and because they now have tools such as groupware that enable these groups to assemble ad hoc without having to relocate their members.

The effect for business is increased productivity, but the immediate benefit is felt on the desktop, where groupware translates into fewer hours of work for the individual.

Alan Kaplan and Robert Lauriston are contributing editors and Steve Fox is a senior editor for PC World.

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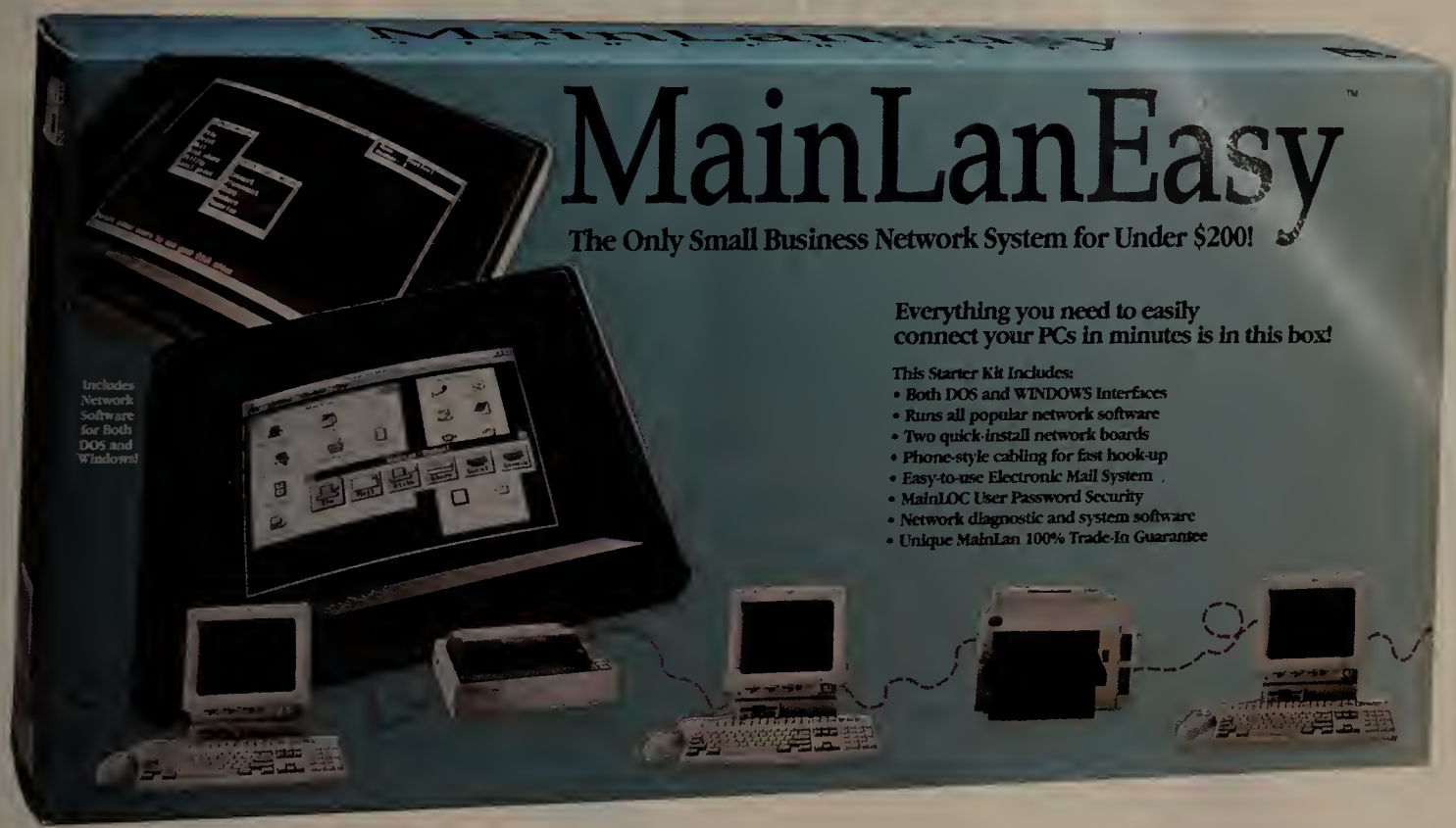

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QUATTRO PRO 4.0

Version 4.0 sets its sights on being the best DOS spreadsheet ever.

BY JOHN WALKENBACH

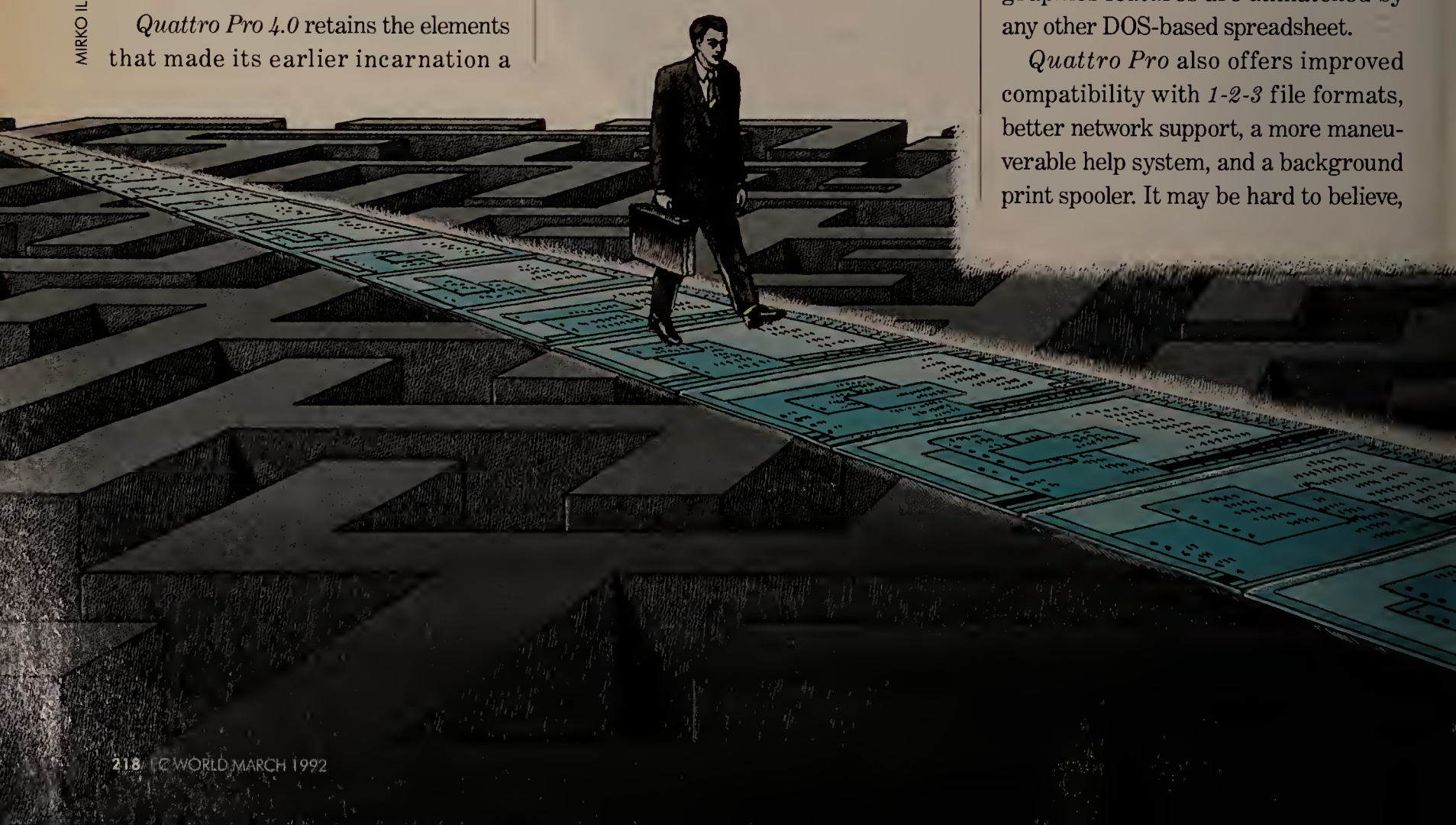
Windows products may be getting a lot of attention these days, but most users still rely on DOS products for the bulk of their work. So when a new version of *Quattro Pro* hits the streets, it's big news. In this case it's also good news: Version 4.0 is arguably the best non-*Windows* spreadsheet available, easily outclassing both versions of *1-2-3* in ease of use.

Quattro Pro 4.0 retains the elements that made its earlier incarnation a standout: an optional WYSIWYG interface, multiple worksheets in memory, presentation-quality graphics, efficient memory usage, excellent macro capability, and modifiable menus, including an optional *1-2-3* command interface. New features abound, the most welcome of which simply enhance the product's day-to-day usability. For example, the handy icon-based button bar will save many trips to the menu, and many of the seemingly endless cascading menus have been replaced with highly efficient dialog boxes.

Taking a lead from *Excel, Quattro Pro 4.0* includes a linear/nonlinear solver, auditing tools, and support for formatting styles. The new analytical graphics features are unmatched by any other DOS-based spreadsheet.

Quattro Pro also offers improved compatibility with *1-2-3* file formats, better network support, a more maneuverable help system, and a background print spooler. It may be hard to believe,

MIRKO ILIC



but the product still has a minimum memory requirement of only 512K of RAM. But unless you have at least a 12-MHz 286 with 640K of RAM, you'll probably want to forgo the WYSIWYG display and stick to text mode.

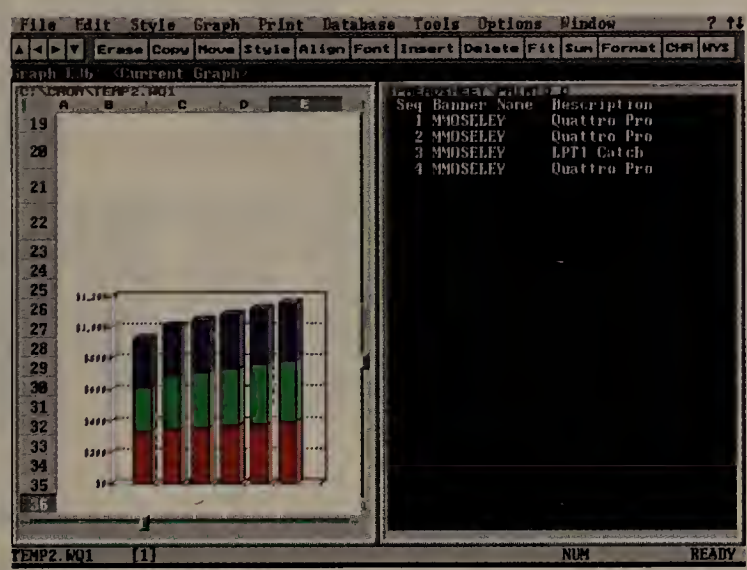
BELLY UP TO THE SPEEDBAR

Following the example of *Excel 3.0* and *1-2-3 for Windows*, *Quattro Pro* has added a customizable button bar. Going by the name of SpeedBar, it's actually a beefed-up rendition of the previous version's mouse palette. The customizability comes into play when you attach your own macros to buttons—a straightforward task.

There are actually two SpeedBars: one for Ready mode (for constructing a worksheet, formatting, placing graphs, and so on) and one for Edit mode. The product ships with the most commonly used commands attached to buttons and includes a button that will automatically insert an @SUM function. The net result is that you won't have to access the pulldown menus nearly as often, and you can perform a greater number of routine editing functions using only a mouse.

Veteran *Quattro Pro* users know that all those cascading pulldown menus can be daunting. Many of these seemingly endless successions of menus have been replaced with long-overdue dialog boxes. For example, you can now specify several different graph settings in a single dialog box.

Other new features include sorting by columns, a Copy Special command that lets you copy only cell contents or formats, and the capability to insert a block of cells by pushing data down or to the right. You can also attach a pop-up note to a range of data, which will display as you scroll through the block name list. As with the prior version, you can select a block of data before issuing a command. In version 4.0, however, the block remains selected after the operation is performed—a handy procedure that's common in *Windows* products.



The Print Manager gives you control over any Quattro Pro jobs you have in the network print queue.

GRAPHING AND THEN SOME

Quattro Pro's greatest innovations are in the area of analytical graphics—using a spreadsheet to explore and analyze your data, not just present it. When you display a graph, for instance, clicking both mouse buttons enables the new zoom-and-pan feature. Unlike with traditional graph zooming, *Quattro Pro* lets you display a portion of a data range without redefining the range. For example, you can quickly zoom to display only the first 3 months of data from a 12-month data series. You can then use the panning controls to show additional plotted data to the left or right of the window.

Other "intelligent graphics" features take the product to new heights. For example, say you have 365 days' worth of sales data assigned to a graph series. A few mouse clicks will aggregate the data by weeks, months, or quarters and display the results in your chart. You can even paste the resulting data into your worksheet. Such a feat used to require tediously setting up formulas and assigning a new data range.

And it gets even better. Besides aggregation, you can specify other data transformations, such as moving averages to smooth out noisy data so you can spot trends. You can also generate a linear or exponential best-fit line that describes your data.

PEACEFUL COEXISTENCE WITH 1-2-3

Quattro Pro has always been an excellent upgrade choice for *1-2-3* users, thanks to the compatible-menu option and support for *1-2-3* files and macros. If you share worksheets with *1-2-3* users, your life will get even easier now that *Quattro Pro* is capable of reading and writing release 3.1 WK3 files. In the case of *1-2-3* 3-D files, *Quattro Pro* opens each sheet as a separate file and

automatically creates link formulas where appropriate.

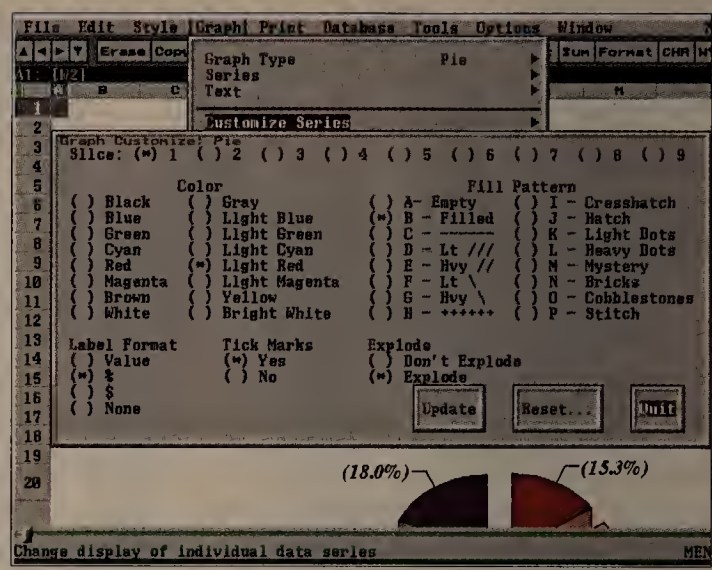
The new upgrade also reads the *Allways* and *Impress* formatting files produced by *1-2-3*. It cannot handle FM3 formatting files from *1-2-3*'s WYSIWYG add-in, however—too bad, since Lotus is shipping the WYSIWYG add-in with all versions of *1-2-3*. When you load a *1-2-3* worksheet that has an associated ALL or FMT file, *Quattro Pro* asks if you want to import the formatting. Unfortunately, this is a one-way street because *Quattro Pro* cannot write formatting information to these file formats.

MORE ANALYTICAL MUSCLE

Quattro Pro has traditionally been weak in worksheet auditing. The new Tools Audit command corrects this. For example, you track cell dependencies in a traversable tree diagram. This is ideal for debugging complex worksheets and can help you understand an unfamiliar worksheet. Auditing powers also extend to locating circular references, formulas that refer to labels or blank cells, and cells that return ERR. You can see the results on screen or send the output to your printer for perusal.

In addition to single-cell goal seeking, *Quattro Pro 4.0* offers a linear/nonlinear optimizer that uses the same analytical engine as *Excel*'s Solver add-in. Not surprisingly, it also suffers from the same drawback: You must enter your problem's constraints into a dialog box manually. *1-2-3 for Windows*, on the other hand, lets you point to a range of constraints in your worksheet and will also find multiple solutions to a problem (*Quattro Pro* finds only one).

Quattro Pro includes a full assortment of @functions, and the new version supports add-in @functions—special-purpose library modules written specifically for *Quattro Pro*. *1-2-3* add-in @functions will not work.



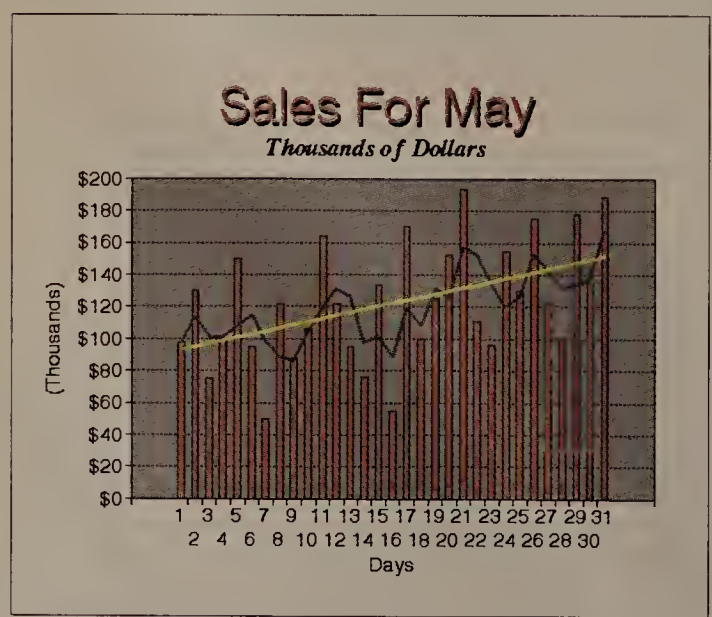
Users can select their display preferences from within the Graph • Customize Series dialog box.

NETWORKS MADE EASY

Dealing with a network, especially from within an application, can seem like voodoo. *Quattro Pro* demystifies the process for networks running Novell NetWare by providing pick lists of available servers and user areas so that you can log on to any network file server directly from the program and map a drive letter to a specific network volume. All you do is type your password, and *Quattro Pro* automates the rest of the process. If you try to access a network file when you're not logged on, *Quattro Pro* will prompt you for your password first.

Improved network support also extends to printing. From within the new Print Manager window, you can view the network printer queue and suspend, resume, or delete your own print jobs. If you're not on a LAN, you can use this feature to monitor your local print queue, provided you've loaded the optional TSR print spooler for background printing.

Whether you're on a network or not, creating fonts is a lot faster now that *Quattro Pro* has replaced the older Bitstream fonts with scalable Bitstream fonts (although you can still use the original fonts if desired). If you open a worksheet created with the original fonts, they will still be used. Since the metrics vary slightly between the two systems, converting a formatted document to use scalable fonts might require some tweaking.



A few mouse clicks can generate line graphs showing a three-day moving average and a linear regression.

EVERYTHING BUT WINDOWS

The $495 *Quattro Pro* is an excellent choice for both novices and power users, especially those who haven't yet made the move to *Windows*—or don't plan to. For that matter, many *Windows* users will find themselves impressed by the logic and simplicity of this interface. Within the non-*Windows* world, *1-2-3* aficionados can make the switch with minimal disruption, and it won't cost much either: *Quattro Pro* offers a $99.95 upgrade to users of competitors' products. The deal is even better for current *Quattro Pro* users, who can upgrade for $79.95. True, it's not *Windows*, but *Quattro Pro* has gone a long way toward demonstrating that there's still life in DOS spreadsheets.

John Walkenbach is a contributing editor for PC World *and the coauthor of* PC World 1-2-3 for Windows Complete Handbook *(IDG Books, San Mateo, California, 1991).*

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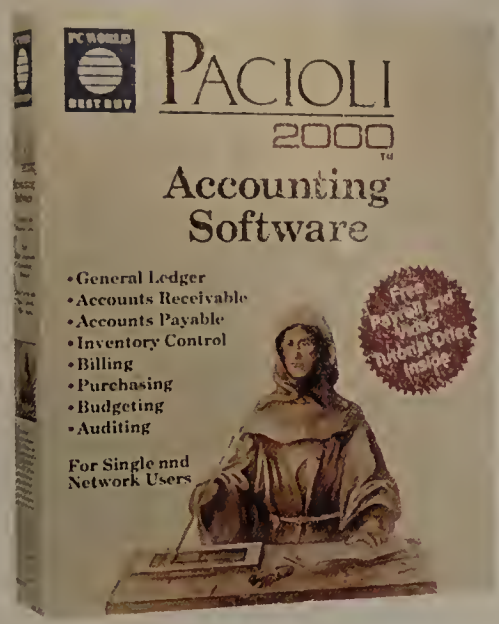

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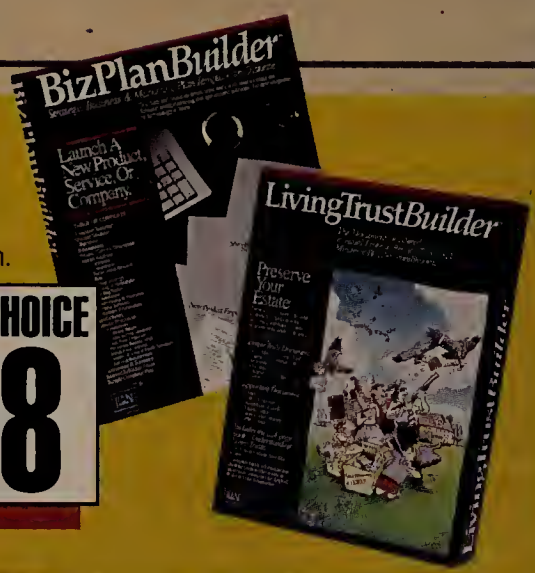

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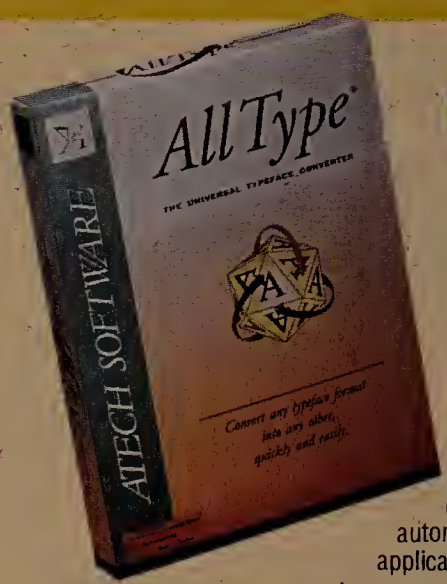

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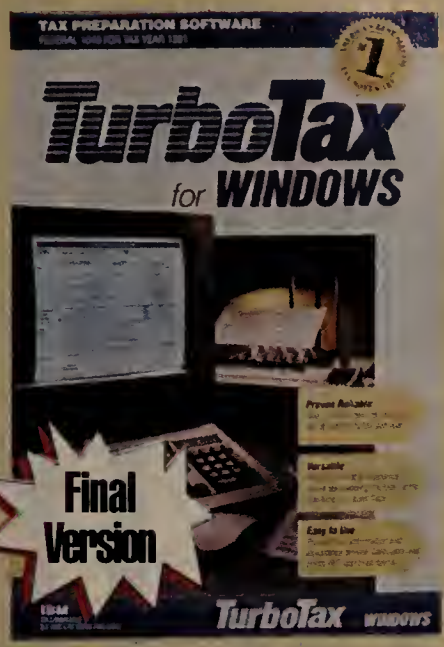

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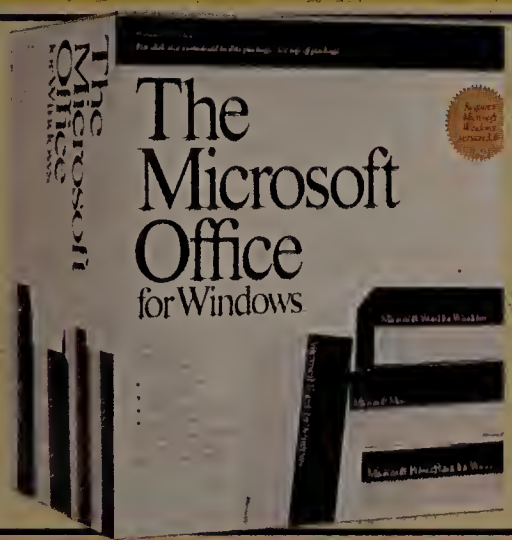

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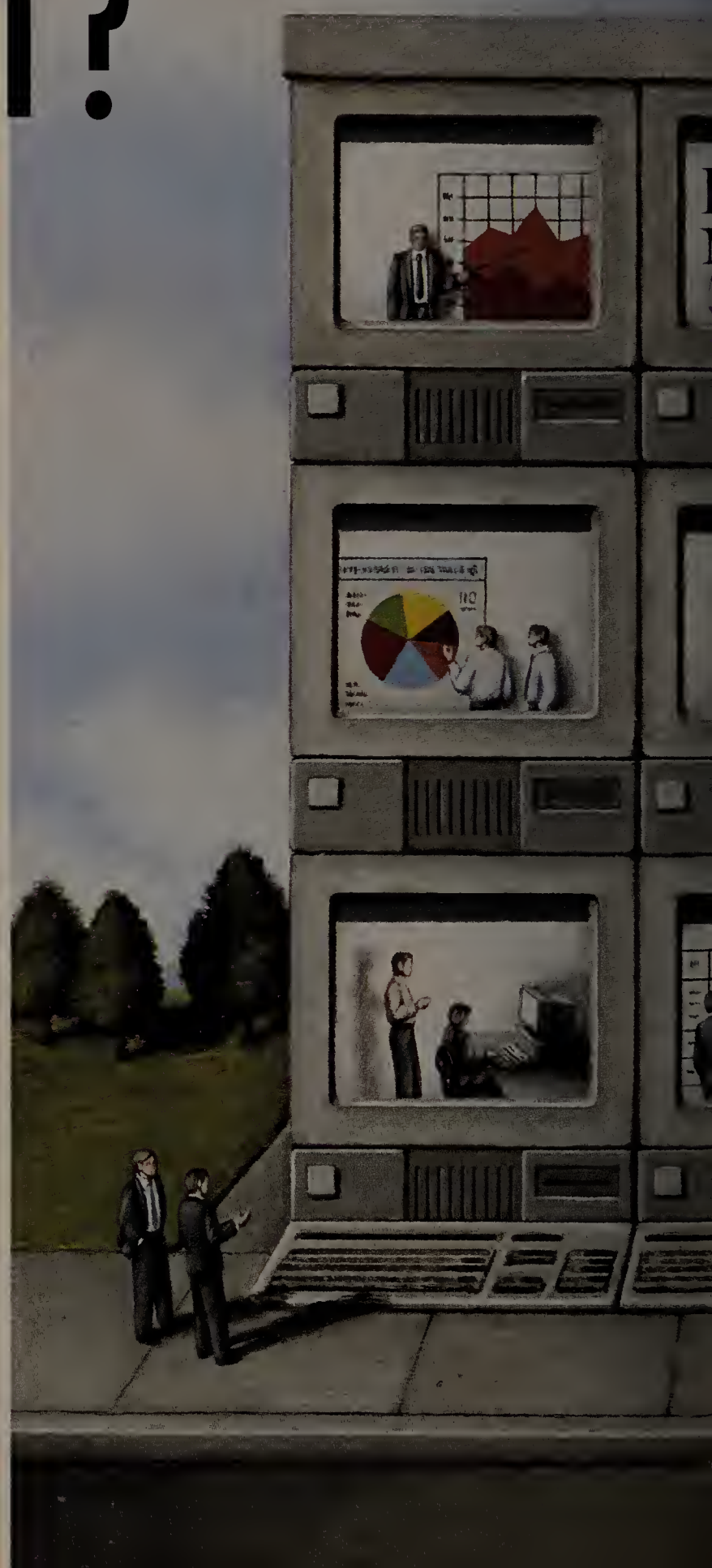
IS WINDOWS WORTH IT?

BY BRONWYN FRYER

When Microsoft introduced *Windows* way back in 1986, the benefits sounded terrific. Training time would be halved. Productivity would double. But has that dream come true for every *Windows* user?

To find out what's really going on in *Windows*-land, we spoke with managers at organizations ranging from small consulting firms to large communications companies. Almost everyone agrees that the payoff for users in reduced training time and increased productivity is nothing short of stunning. But the people who have to make sure that *Windows* runs still don't trust its stability or its networkability. And certain other issues, such as DOS users' resistance and the lack of a standard macro language, loom large.



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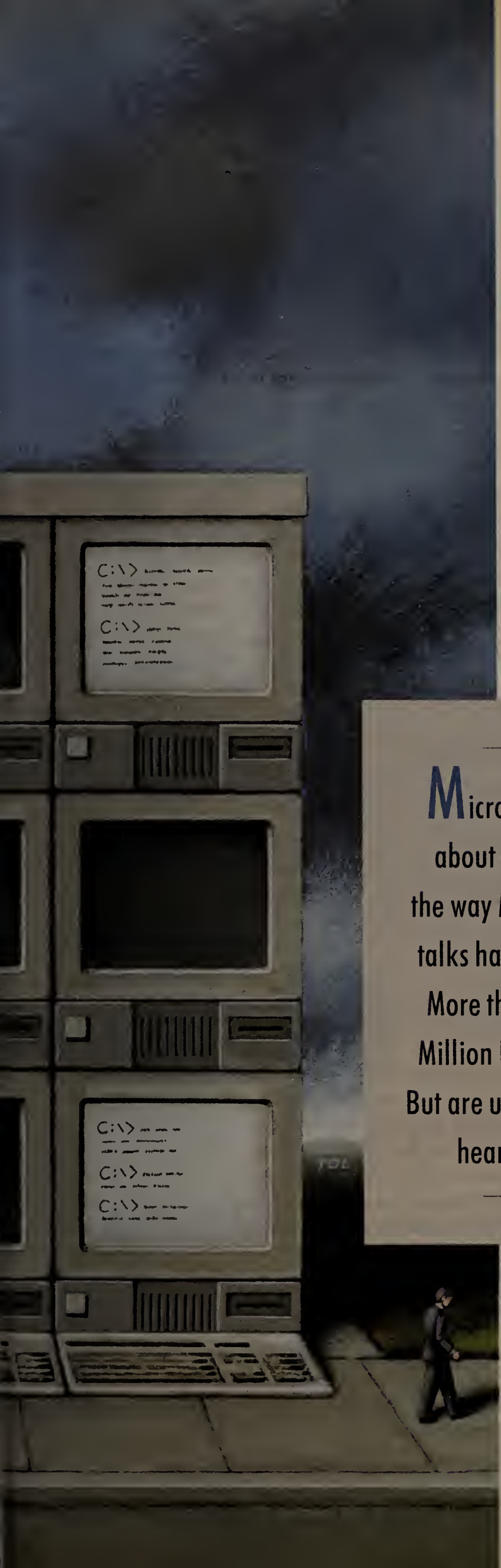
THE PAYOFF: FASTER TRAINING, HIGHER SKILLS

PED Manufacturing in Oregon City, Oregon, is typical of a company facing a new crop of *Windows* challenges. In 1987, the 100-employee firm, which manufactures castings for the aerospace and medical industries, had



strong business motivations for spending nearly $100,000 to switch its 45 computer users to *Windows*. "We were bringing in lots of new employees, and we wanted them to get up to speed quickly on several applications," says Information Sytems Manager Dave Howell. "But we didn't want to do a lot of development. And we wanted applications to talk to each other so we could ensure optimum productivity."

Prior to *Windows'* arrival, most users at PED were Johnny-one-notes who used a single DOS application—either *1-2-3* or *WordPerfect*—and didn't experiment with other programs. Today, PED feels the investment has largely paid off. Training time has been cut by 40 percent, and almost everyone now uses five applications—*Word for Windows* for word processing, *Excel* for analysis, *Mail* for communication, *PackRat* for contact information, and *Superbase* for data management. "By cross-training on several programs, people can easily move among departments and contribute more to the entire organization," says President Richard Day.

Microsoft talks about Windows the way McDonald's talks hamburgers: More than Seven Million Units Sold. But are users getting heartburn?

PED now has a new hurdle ahead of it: integrating the company's bread-and-butter applications into the *Windows* front end. "We have all our accounting, order-entry, job-costing, and quality-assurance applications running under UNIX, and all our touchy-feely tools under *Windows*," says Day. "We want our back-office applications to run under *Windows* on the network, but we're not sure where to start."

THOSE NASTY UAES: WILL 3.1 HELP?

Integrating bread-and-butter applications into the "touchy-feely" *Windows* environment may not be easy. Most organizations seem reluctant to trust their mission-critical applications to *Windows,* due to a prevailing belief that the environment remains unstable.

This instability manifests itself most often in the dreaded Unrecoverable Application Error (UAE), which usually locks up the PC entirely. According to Terry Kelly, a technical services analyst in the chemical development labs of pharmaceutical giant Burroughs Wellcome, this mistrust led his division to standardize on Macintoshes in 1990 instead of on PCs. "In a scientific environment, stability and maturity is the issue," Kelly explains. "We were having a lot of problems with UAEs; I'd end up losing group files mysteriously. And lot of the new applications for *Windows* weren't here yet. Besides, *Windows* was slow. We had to go with what worked."

Firms already committed to *Windows* have learned that proper system configuration goes a long way toward putting users on solid ground. "*Windows 3.0* seemed to work pretty well if users were conservative with memory," says Bill Remmert, former manager of end-user computing for GTE Spacenet. "And we made sure we always had plenty of space on our drives."

Perhaps the best solution will prove to be *Windows 3.1,* which many beta testers believe will send UAEs the way of the stegosaurus. "Version 3.1 takes a big step toward solving the problem with UAEs," says Brad Sherrin, a senior systems analyst with Shell Canada. "It's much more stable than *3.0,* and it addresses a lot of the file management issues that users face."

Despite *3.1*'s improvements, however, some feel *Windows* will never completely overcome the stability problem. When an application bombs in *3.1,* the user can close it without rebooting the entire system; but this work-around ignores the question of why such mishaps occur. "The real problem is that *Windows* was built on top of DOS," says John McCarthy, an industry analyst with Forrester Research of Cambridge, Massachusetts. "*Windows* will never be as industrial-strength as more robust operating systems like UNIX. It's like trying to turn a bicycle into a Ferrari."

NETWORK TANGLES

Another challenge is networking. Installing *Windows* on a network server for workstation clients does not necessarily simplify administration and maintenance tasks. "If you run *Windows* from a server, setting up WIN.INI files for users who have different hardware or program groups is complicated," says Howell. Indeed, running *Windows* on a network demands the right hardware, serious planning, and careful implementation—or you can end up with sore users.

The most popular of the three major network operating systems, Novell's NetWare, has a history of performance problems, network errors, and system crashes in its encounters with *Windows.* And it's no simple matter to find technical experts who can resolve these difficulties, adds Joey Gurango, a senior consultant with Match Data Systems of Bellevue, Washington. "Finding people who know how to run *Windows* on a Novell network is a nightmare," Gurango notes. "If you call Microsoft technical support, they can't help you."

> 'We want our back office applications to run under Windows on the network, but we're not sure where we should start.'

Using the correct NetWare release will help, but finding the right release can be tricky. After *Windows 3.0*'s introduction, Novell distributed a Chinese menu of NetWare shell versions: Version 3.01 came in revisions A, B, C, D, and E, and only 3.01E ran properly. (As of this writing, *Windows* requires NetWare 3.11, 3.22, or the NetWare Lite version of the NetWare shell.) The only way to keep up-to-date on NetWare's version changes is to constantly monitor Novell forums on CompuServe.

Other major network systems also require the correct version to run *Windows:* Banyan's VINES requires version 4.0, and Microsoft's *LAN Manager,* formerly available in five flavors, now comes in a new version, *2.1.*

The key to avoiding networking difficulties is to run *Windows* from individual workstations rather than from a server. Caveats remain, however: In networked environments where resources are shared, *Windows* workstations should be configured to provide users easy access to printers, and network drivers should be moved into high memory. Although network administrators in large companies may find it inconvenient to visit each user in order to upgrade *Windows,* this is a nonissue for a small company like PED since, Howell notes, "Microsoft doesn't upgrade *Windows* more than once a year."

RATHER FIGHT THAN SWITCH?

A larger issue has been persuading DOS diehards and *WordPerfect* loyalists to switch to *Windows*—a problem companies tackle in different ways.

At PED, a former *WordPerfect* shop, the need to get all users up and running on a *Windows* word processor overrode any thoughts of waiting in line for *WordPerfect for Windows.*

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Despite some resistance from *WordPerfect* users, PED chose to standardize on *Word for Windows*. Even though *WordPerfect for Windows* is here, it's too late now to switch back, says Howell.

Now that users are up to speed on *Word for Windows*, the company doesn't have any regrets about its decision. But many agree that such resistance should be dealt with respectfully. "The psychological and political issues can't be ignored," says Remmert. "People are being asked to switch not only to *Windows* but to new applications. They're afraid they'll lose productivity."

Remmert's strategy for persuasion? "We hooked users into *Windows* by giving them a package we thought they'd like without taking away their DOS applications, using *Windows* as a DOS shell." Once a few of the GTE engineers had played with *Microsoft Project*, for example, Remmert received 15 requests for the package within the course of a single week.

PED Manufacturing, on the other hand, baited its hook with new 386s: "We gave the 386s to *WordPerfect* users," says Howell. "If we saw them using DOS, we told them we'd have to give their new system to a *Windows* user. After that, even the diehards stuck with *Windows*."

TOMEK OLBINSKI

WINDOWS TRADE-OFFS

CAN'T LIVE WITH IT

- Few technical experts
- UAEs
- Poor network integration
- Resistance from DOS power users
- Slow performance
- Lack of standards among software users

CAN'T LIVE WITHOUT IT

- Common user interface
- Reduced training time
- Increased productivity
- Multitasking
- More than 5000 applications available
- Easy access to fonts and graphics

APPLICATION ESPERANTO

One of the chief lures of *Windows* is its capability to link applications. With Microsoft packages like *Word for Windows* and *Excel*, for example, a Dynamic Data Exchange (DDE) link allows users to incorporate data from spreadsheets into their word-processed documents and manipulate it there. Although many vendors would like their applications to link to those of other vendors, such hookups aren't always practical. "We'd like to be able to link Microsoft's *Word for Windows* to Software Publishing's *Superbase*," says Howell, "but it would take too much work."

Programming such DDE links is difficult for even the savviest technical expert. Vendors agree that Object Linking and Embedding (OLE) is both easier for vendors to support and easier for users to work with than its DDE subset. Instead of copying data from one program to another, OLE users create "live" links and can actually work in two applications at the same time. With its built-in support for OLE, *Windows 3.1* should make it easier for applications from a wide variety of vendors to communicate with one another.

Another issue that confronts programmers is the lack of a standard macro language among *Windows* applications. At Shell Canada, this obstacle is making life difficult for the handful of technicians who support approximately 4000 PC users. "We can't do anything but put out fires," explains Sherrin, "and most users can't convert *1-2-3 for Windows* macros to *Excel* macros by themselves."

While going with a single vendor for all *Windows* packages is one possible solution to the problem, few companies select this route. "We want to be able to pick and choose our applications," Sherrin notes.

LIVING UP TO ITS PROMISE

"If you have an existing base of DOS users with 8088 hardware, switching to *Windows* can be tough," says Howell. "But if your company is growing and you need to add new PCs anyway, switching should be relatively smooth."

The consensus among companies that have switched successfully is that *Windows* is worth it. At GTE Spacenet, the *Windows* graphical user interface makes it so easy for users to figure things out for themselves that problem report rates have dropped 30 percent in two years, even though employees use twice as many applications. Shell's Sherrin claims that *Windows'* multitasking capabilities enable users to work much more quickly and flexibly. "One task that used to take a person an entire day now takes 5 minutes," he notes. "*Windows* is finally beginning to live up to its promise."

Even with such productivity gains, many feel *Windows* has plenty of growing up to do. Gurango says the current *Windows* market reminds him of the 1986 Macintosh market. "Anyone who tells you the *Windows* market is fully developed," he says, "is sadly mistaken."

Bronwyn Fryer is an associate editor for PC World.

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SPREADSHEETS (A..Z)

Practical tips for building better worksheets

by Richard Scoville

Security. We all want it. And if you keep sensitive salary figures, client information, or other strategic data in your spreadsheets, you need to keep it secure from prying eyes. Today's spreadsheet programs offer a variety of features for protecting your sensitive data from snoopers. But there are conditions where each can be breached by any busybody with sufficient technical know-how. In this month's column, I'll use *1-2-3* release 3.1 to illustrate the kinds of security features available in the leading programs, and I'll show when—and when not—to rely on them.

Let's say you're preparing a budget based in part on a schedule of salary information for individual managers, like the one shown in **FIGURE 1a**. The salary total in cell B9 is public information, but you need to keep the individual salary amounts confidential. You'd like to allow co-workers to enter other expense items into a budget worksheet that displays the current salary total (**FIGURE 1b**), but you want to prevent them from viewing individual salaries.

In your first attempt, you build a single worksheet that contains both the salary schedule and the budget report. You try to hide cell values with */Range•Format•Hidden.* Sure enough, the values disappear. But when you put the cell pointer in a cell that contains an invisible salary, you notice that its contents appear in the cell indicator at the upper left corner of the screen. Couldn't a snoop find the general area where the salaries are located and use */Range•Format•Reset* to redisplay them?

After perusing the manual, you up the ante. First, you insert a second page into your worksheet with */Worksheet•Insert•Sheet•After,* and you move the budget onto sheet B:. Then you execute the command */Worksheet•Global•Prot•Enable.* With protection switched on, no one can make entries anywhere in sheet A:, and the cell indicator no longer reveals the contents of hidden cells (assuming they're still hidden). Then, to ensure that no curious hacker can crack your scheme, you issue the command */File•Admin•Seal•File* and enter a password. Now no one can turn the global protection off or unhide the sensitive cells without that password. You save your file with the name SALARY. Secure at last?

Well, at least you've erected another barricade. But suddenly you realize that you can always view the contents of a cell by building a formula that refers to that cell. And since *1-2-3* (and *Quattro Pro* and *Excel*) lets you build formulas that refer to cells in another worksheet file, you can bypass any security measures within that file simply by creating a screen full of linked formulas: You create a new worksheet with */File•New•After.* In cell A1, you enter the formula +<<**SALARY**>>**A1**. The worksheet title from SALARY appears. Then you copy that formula into the range A1..D9, and sure enough, the formulas dutifully display the contents of

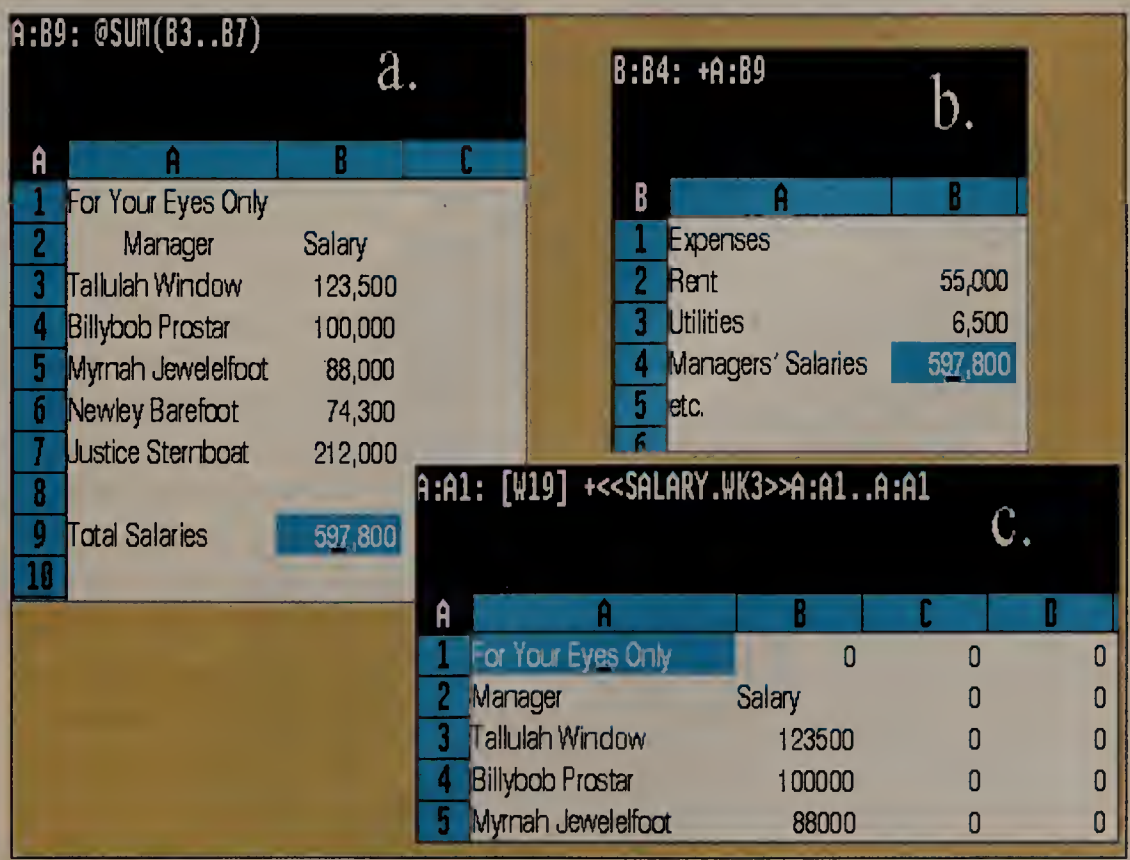

FIGURE 1: You can hide the salaries in the worksheet shown in FIGURE 1a, but people with access to the worksheets 1b or 1c will still be able to find them.

ANTHONY RUSSO

Spreadsheet Toolbox

Finding the Password

You may be a little hesitant about entrusting important data to a password-protected spreadsheet file. If you lose the password, not even the manufacturer of your spreadsheet program can retrieve it—or so you've been told. Well, guess what? Two nifty utilities from Access Data Recovery, *XLpass* (for *Excel* files) and *LTpass* (for *1-2-3* and *Quattro*) are designed to do just that. To decrypt a worksheet, you simply select the file; after grinding away for a minute or two, the utility displays the password.

How does it work? When a spreadsheet protects a file, the data gets scrambled into a pattern that's based on the password, but the password itself isn't stored in the file. *LTpass* (or *XLpass*) analyzes the file to figure out what passwords might have reduced spreadsheet structures to the observed bit patterns. When it has narrowed the choices to a few thousand, it tries them out one at a time; eventually, it finds one that decodes the file.

The good news is, you can get your data back even if you lose the password. The bad news, of course, is that anyone with a copy of these utilities can decrypt your files. For real security, save sensitive data on floppy disks, and put them somewhere out of reach.

XLpass, LTpass $185; Access Data, 87 E. 600 South, Orem, UT 84058; 800/658-5199, 801/224-6970
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all the hidden, protected, "secure" cells in your salary schedule (**FIGURE 1c**).

Another foray into the manual reveals that you can save a worksheet so a user must have a password to retrieve the file, and that you cannot build formula links into a file that's been saved with password protection! So you take one last stab at the problem. First, you use */File•Xtract•Formula* to move the budget report into a separate worksheet file, and build a linking formula (+<<SALARY>>A:B9) to display the salary total in the proper cell of the new sheet. Then, you can save the salary schedule with password protection: */File•Save,* enter the name of your salary file, a space, and the letter **P** (for *password*). At the prompt, you enter a password. Now a meddlesome minion cannot retrieve the salary schedule, take a peek at it, combine it into a blank worksheet, or build formulas that link to it. You finish by saving the new budget file as SALBUD.WK3, and close both files. Perfect!

Or is it? Later, you retrieve SALBUD to fill in more expenses. Everything looks okay at first, but when you select */File•Admin•Link-Refresh* to update the formula links, your salary changes to ERR. A little experimentation reveals that *1-2-3* cannot update formula links into a password-protected file.

In short, it's all or nothing: If users can open a *1-2-3* worksheet file, they can build formulas to view the contents of any cell; if you password-protect the file, then you can't reliably provide selected access to its information. There is simply no secure way to base a formula on confidential information but open the results of that formula to everyone.

Users of other spreadsheet programs will be similarly disappointed. In *1-2-3* release 2, you don't even get a */File•Admin•Seal* command to lock the cells' formatting.

In *Excel*, the situation is similar. Using *Format•Number*, you can create a custom format (;;;) to hide cell contents, and with *Format•Cell Protection* and *Options•Protect Document*, you can prevent users from viewing the salaries. But unless you protect the salary schedule with *File•Save As•Options•Protection Password*, users can still build linking formulas to view the cell contents. If you put the budget into a separate sheet and build a linking formula to display the salary total, a user must have access to the password in order to update the links.

Quattro Pro's security system is similar to *Excel*'s. You can secure the data in a password-protected worksheet, but users must have the password in order to refresh the links.

In short, if you have sensitive data in your worksheet files, beware. The security options offered by the major spreadsheet products do not provide adequate protection for data in an open file; and if you store the data in a password-protected file, your users won't have access to open data that depends on secret information.

Questionable Spreadsheets Department

Q. *We have a large* 1-2-3 *release 2.2 spreadsheet (800 lines), and we need to print the final draft double-spaced on our Fujitsu RX7100 laser printer. Can you help us solve this problem?*

Marianne Matthews
Toronto, Ontario, Canada

A. The Fujitsu RX7100 is an HP-compatible printer, so you can switch it into double-spaced mode and legal size paper with a setup string. Then adjust the margins and page length to appropriate values, and fire away. Try this:

Select */Print•Printer•Options•Setup*, and enter the setup string **\027E\027&l3D\027&l3A**. (Be careful as you type this in; the string is case sensitive, and what looks like the number 13 is really a lowercase *L* followed by a 3.) What does this mean? The portion

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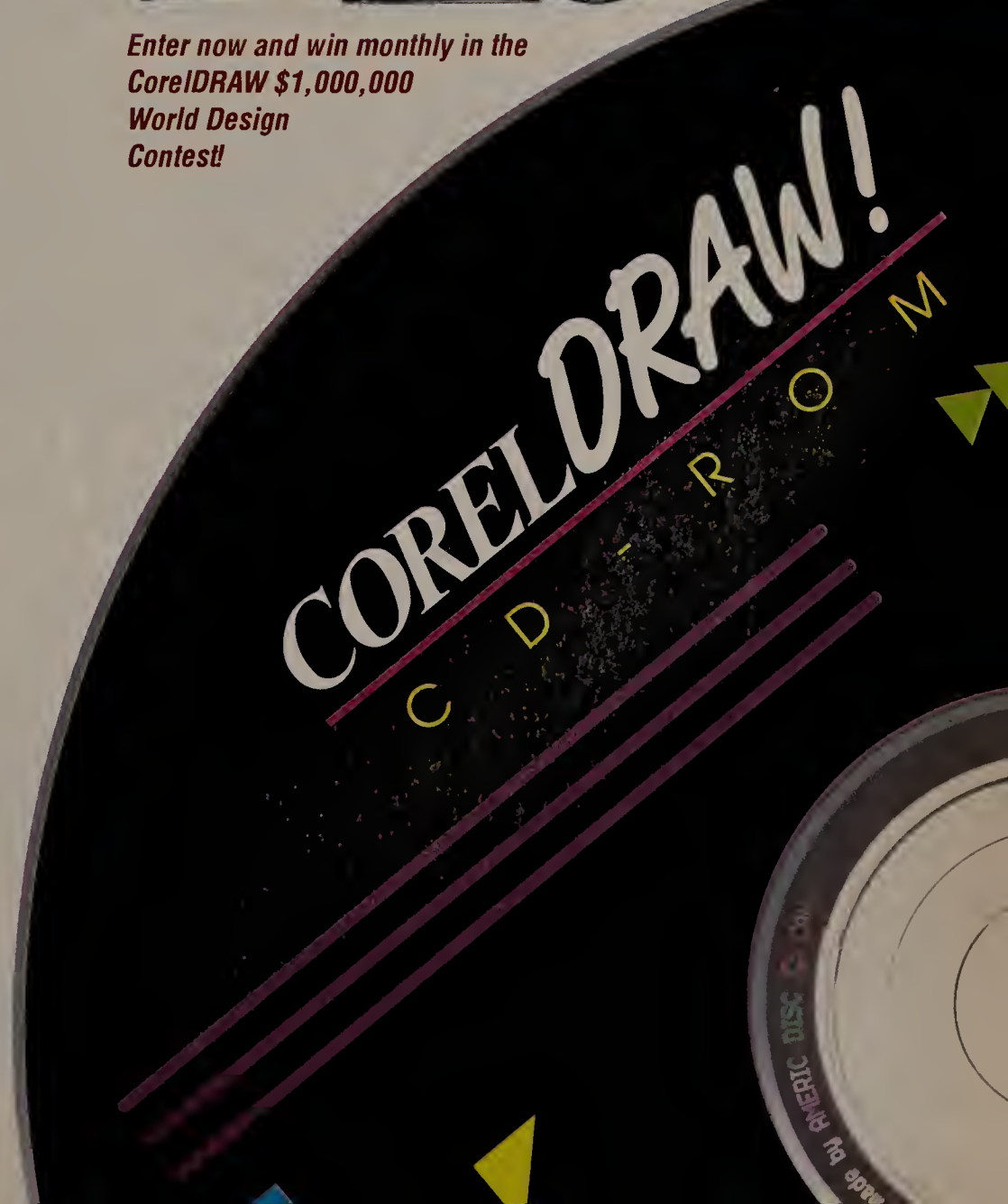

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before the second backslash selects double-spacing, and what follows selects legal-size paper. Then select *Pg-Length* and enter **38** (that's 3 lines per inch times 14 inches = 42 lines, less 4 for top and bottom margins). Set the top and bottom margins to **0**, and you're all set. Select *Quit•Go•Quit* to print your file and return to the worksheet.

Do you have a spreadsheet question, a macro problem, or a hot tip you'd like to share? PC World *will pay $50 for each published question. Send your questions to Richard Scoville, CompuServe 72341,2727; MCI Mail 357-4517; 415/442-1891 (fax); or mail them to* Spreadsheets (A..Z), PC World, *501 Second St. #600, San Francisco, CA 94107. Sorry, we cannot acknowledge submitted materials.*

Richard Scoville and Ralph Soucie are contributing editors for PC World.

Excel Shortcut

Get the Lead Out of Goto

by Ralph Soucie

Excel's Goto command (<F5>) does more than plop your cursor down in another part of your spreadsheet. Some little-known tricks can save you plenty of time.

Suppose you're moving back and forth between two locations in the spreadsheet, but you'd rather not split it into panes. After using Goto to get to one of the locations, press <F5>, then <Enter> to return to the other. From then on, you can toggle between those spots by pressing <F5> and <Enter>.

Here's another common problem. You need to apply identical formatting to several discontinuous cell ranges, each with a different range name. For instance, you might want to bold your Weekly, Monthly, and Annual total ranges.

First, press <F5> to bring up the Goto dialog box, then enter the names of the ranges to be formatted, separated by commas. For instance, you might enter Weekly, Monthly, Annual. Press <Enter> or select OK.

All three ranges will now be selected, allowing you to format them all at once. To bold them, select *Format•Font•Bold.*

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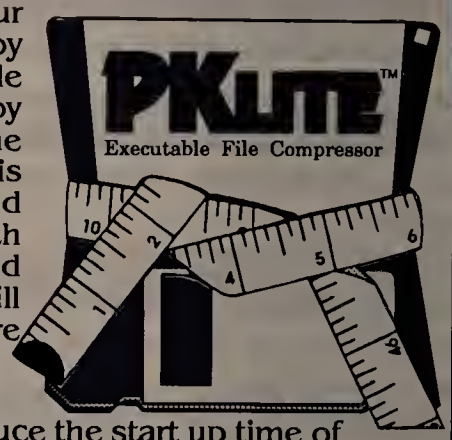

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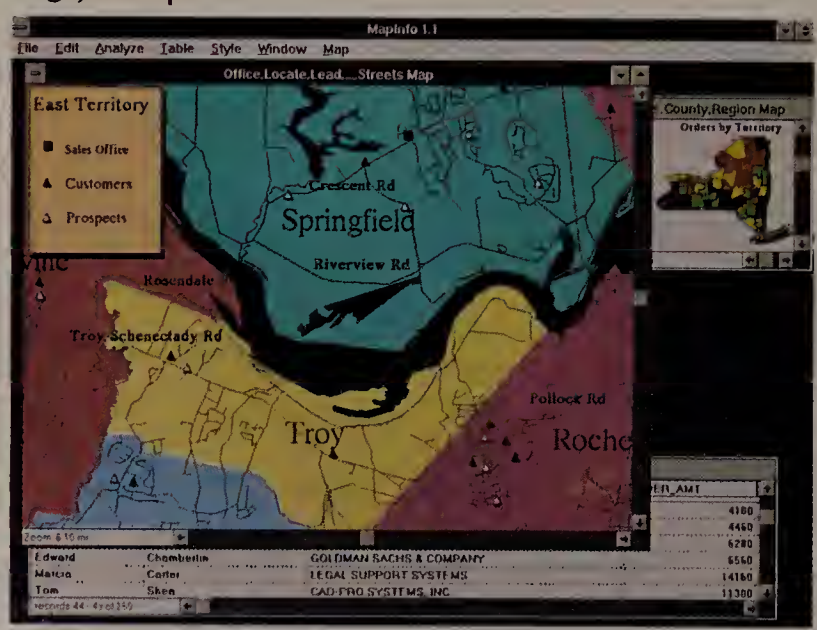

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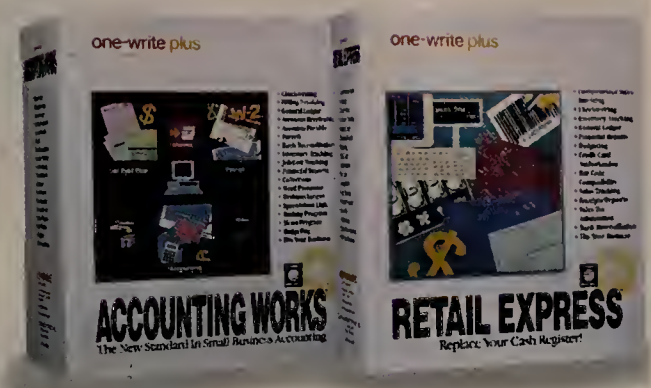

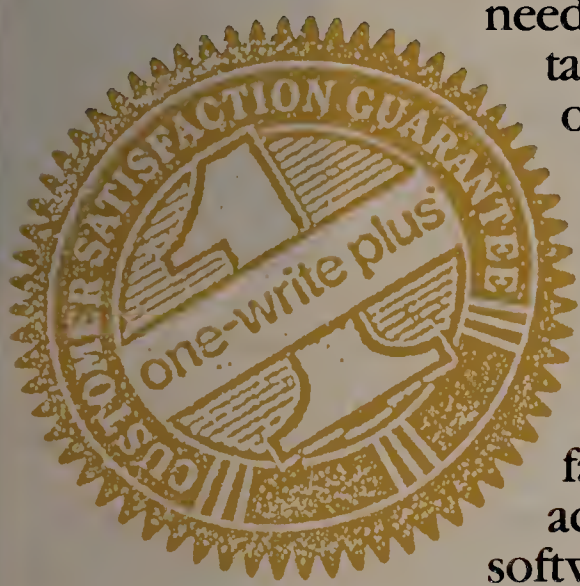

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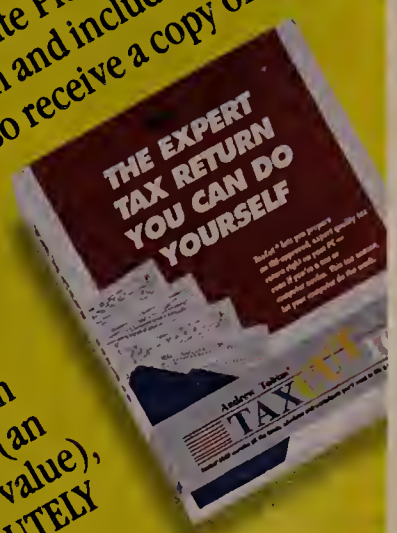

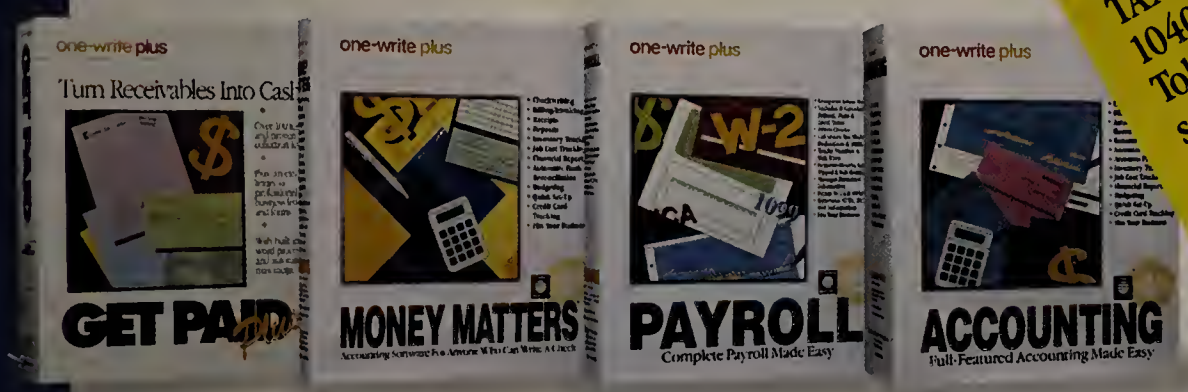

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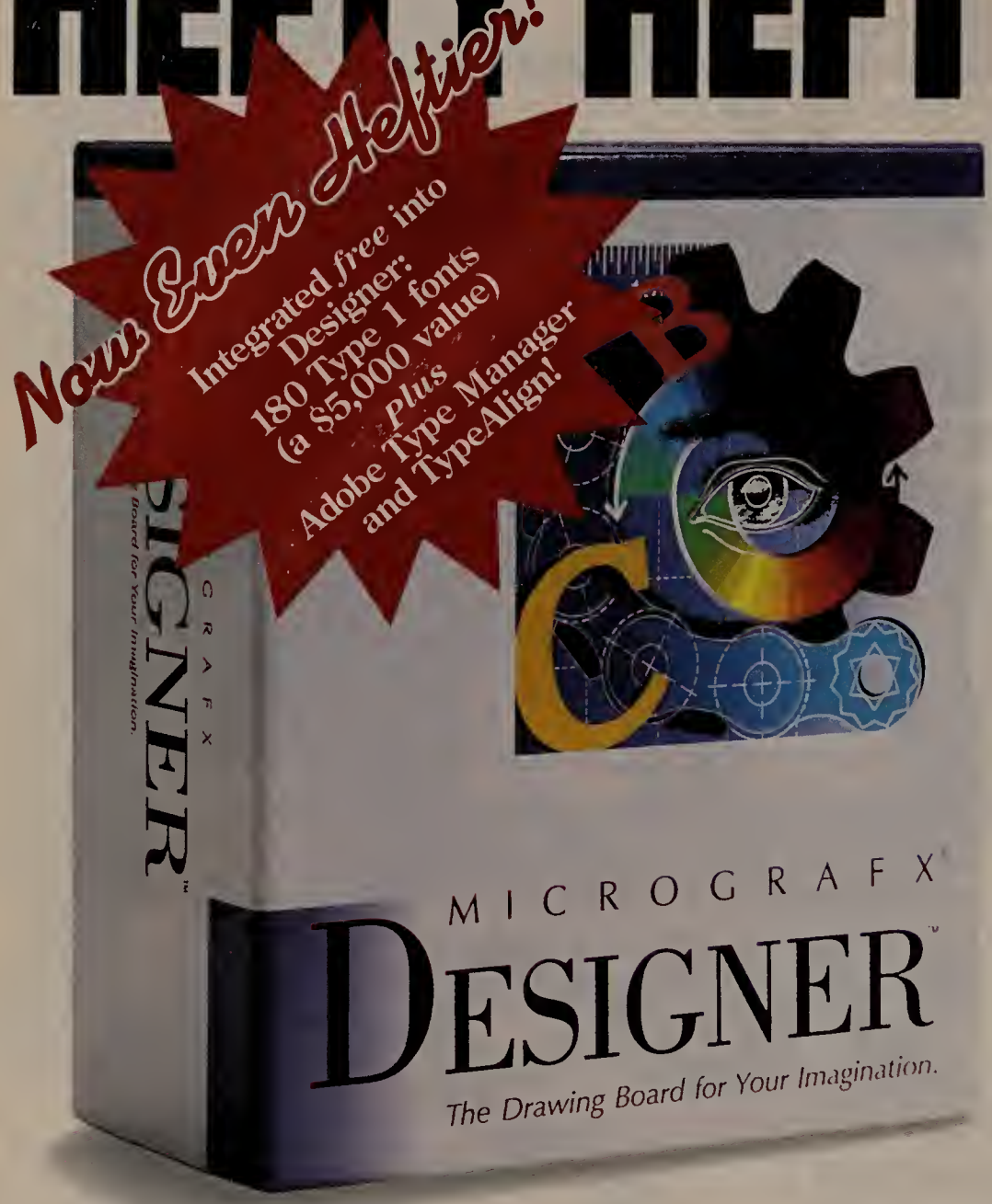

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Drawing layers	64	1
Dimensioning	Yes	No
Object snap	Yes	No
Maximum drawing size	132″ × 132″	17″ × 17″
Edit in full color	Yes	No
Clip art images	Over 1,700	750
Type 1 fonts	180	0
PageMaker 4.0 filter	Yes	No
On line help screens	Yes	No
24-hour support	Yes	No

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Designer system requirements: 286 (386 recommended) IBM PC or compatible, or PS/2. 1 MB RAM (2 MB RAM recommended). 20 MB (or larger) hard disk. Windows 3.0. DOS 3.1 (or higher). Mouse or digitizing pad. Windows-compatible monitor.

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WORD PROCESSING CLINIC

Tips for getting the most out of your word processor

by George Campbell

Q. *I create hundreds of files, and finding the one I need can be a real chore. Which word processors let me search through my directories for keywords?*

John Freeman
College Station, Texas

A. These days, many word processors have document management tools that let you search through a directory of files for any text you specify. Among character-based programs, *Microsoft Word 5.5*'s searching feature is particularly good. Just choose *File Management*, select *Search*, and enter up to 80 characters of the text you want to find on the Keywords line; you can also search by author, date, and other characteristics. *Word 5.5* will go through all the *Word* documents on your disk and display a list of files containing the keywords you entered.

If you use *Windows 3.0*, your choices are even broader, with *Word for Windows*, *Ami Pro*, and *WordPerfect for Windows* all offering similar tools.

Q. *My* WordPerfect 5.1 *mail merge data file contains more than 400 names and addresses—with every character capitalized. I want to capitalize only the first letter of each word, along with the state abbreviations, but converting the file manually would take too long. Is there anything I can do to automate this process?*

Marianne V. Shackles
Smithtown, New York

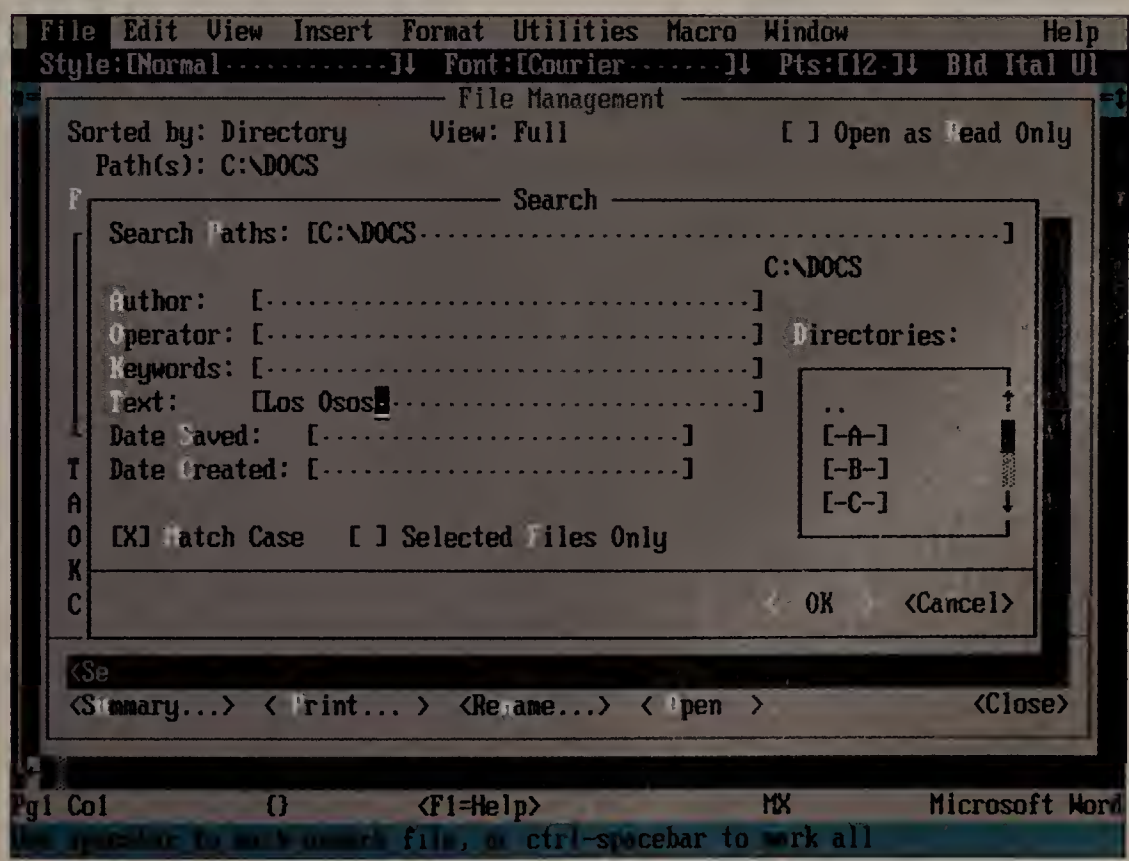
A. You can solve this problem by building a macro to capitalize the first letter of each word in your data file. First, load your merge data file into *WordPerfect*. Then follow the steps below to create and store the macro.

1. Press **<Ctrl>-<F10>**, and then type **mixcase**. Press **<Enter>**, type **Convert All Caps**, and press **<Enter>** again.
2. Press **<Alt>-<F4> <Ctrl>-<Right> <Shift>-<F3>L**.
3. Press **<Ctrl>-<Left> <Alt>-<F4> <Right>**.
4. Press **<Shift>-<F3>U<Ctrl>-<Right>**.
5. Press **<Ctrl>-<F10>** to finish recording the macro.

To use the macro:

1. Load the offending mail merge data file.
2. Press **<Ctrl>-<F2>C** to get a word count. Make a note of the count, then press **<F7>**.
3. Press **<Home><Home><Up>** to move to the top of the file.
4. Press **<Esc>**, type a number about 50 percent greater than your word count, and press **<Enter>**.
5. Press **<Alt>-<F10>**, type **mixcase**, and press **<Enter>**. After a short delay, the first letter of each word will become capitalized.

You'll need to change the second letter of state abbreviations back to a capital letter, but this macro will accomplish 90 percent of your task.



Word 5.5's File Management command lets you search through a directory of documents for specific text. Just type keywords to display a list of files containing the text you're after.

ANTHONY RUSSO

Q. *I have a* WordPerfect 5.0 *document with two columns of numbers positioned with decimal tabs. I want to swap the columns, so the one on the right becomes the one on the left. Can you help?*

David Mack Pipes
Baton Rouge, Louisiana

A. It's relatively easy to move tabular columns in *WordPerfect.* Here are the steps, which work in both version 5.0 and 5.1.

1. Move the cursor to the beginning of the first number in the column you want to move, and press <Alt>-<F4>.

2. Move the cursor to the end of the last number in the same column. Ignore the extraneous highlighting.

3. Press <Ctrl>-<F4>C, then press M at the next prompt. The column will disappear temporarily.

4. Move the cursor to the left or right of the top number in an existing column, then press <Enter>. Voilà! Your column of numbers will insert itself in the new position.

Q. *I recently switched from* WordStar *to* WordPerfect 5.1. *One of the things I miss is a menu system for macros. In* WordStar, *I could press <Esc> to see a list of macros with their definitions. Try as I might, I can't find a similar tool in* WordPerfect. *Am I missing something?*

Steven Maguire
Port Richey, Florida

A. Unfortunately, there's no easy way in *WordPerfect 5.1* to view the description and then execute the desired macro with a keystroke.

Still, you can look at the descriptions. Press <F5> anytime you're in editing mode. Type the drive and directory for your macros, plus *.WPM (for example, C:\WP51*.WPM), then press <Enter>. You'll see a list of available macro files. Use the cursor keys or your mouse to select a macro, then press L. You'll see the description on the screen.

You can then press N to view the next macro or P to see the previous one. Once you find the right macro, press <Enter>, make a note of its name, then press <F7>. To execute the macro, press <Alt>-<F10>, type the macro's name, and press <Enter>. If the macro file has a name like ALTP.WPM, you can execute it anytime by pressing <Alt> plus the fourth letter of the name (e.g., <Alt>-P).

Send your word processing questions to George Campbell, CompuServe 71571,222; MCI Mail GCAMPBELL; 415/442-1891 (fax); or mail them to Word Processing Clinic, PC World, *501 Second St. #600, San Francisco, CA 94107.* PC World *pays $50 for published questions. Sorry, we cannot acknowledge submitted materials.*

George Campbell is a contributing editor for PC World.

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DATA BASICS

Tips and techniques for managing your data

by Steve Cummings

Q. *How do I view records from a* dBASE IV *file sorted by the results of a calculation?*

Marvin Watanabe
Dallas, Texas

A. You can view them by indexing on the calculation. Say your SALES data base contains separate fields for projected and actual sales: Sales_Proj and Sales_Act. To display the data in order of how close actual sales are to the target, create a calculated index expression as follows: From the Control Center select the SALES file, and press **<Shift>-<F2>** to open the Design screen. Next, choose *Organize•Create New Index•Name of Index,* and type something like **PerTar** to name the index. Press **<Enter>** and choose *Index Expression.* Now enter the expression **Sales_Act/Sales_Proj**, and press **<Enter>** again.

Press **<Enter>**, then **<Ctrl>-<End>** to confirm your entry. To display the file sorted by the index expression, press **<F2>**.

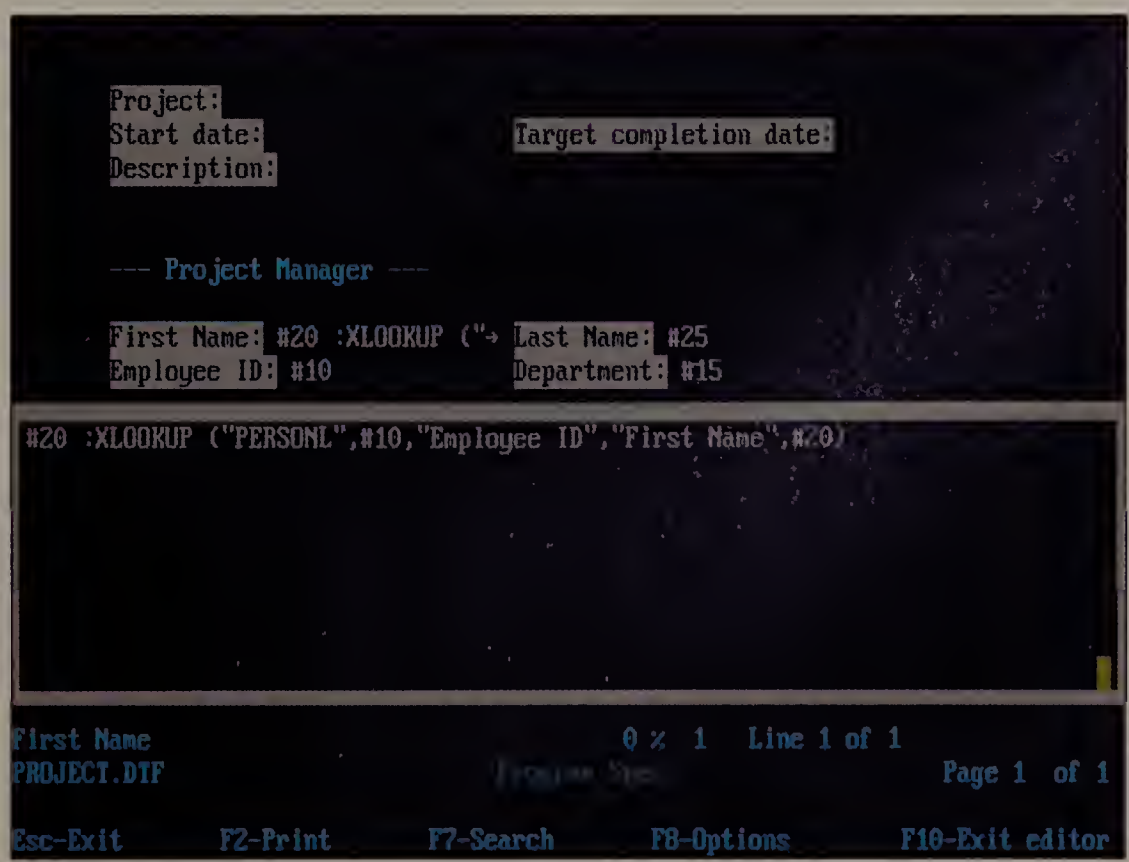
Q. Q&A *has served me well in the past, but I seem to have run up against its limitations. I need to create a project-tracking file that will keep a lot of the data—phone numbers, titles, and so on—that's already in my personnel file. Is there a simple way to share information between the two files while sticking to a nonrelational data base like* Q&A?

Signe Richardson
Boise, Idaho

A. Short of switching to a truly relational system, your best bet is to use *Q&A*'s XLookup function, which automatically copies data from one *Q&A* file to another in a quasi-relational manner. Let's assume your personnel file is named PERSONL and that it contains an Employee ID field (this one must be indexed) and a First Name field. When you create the new PROJECT file, make sure that it too has these fields, as well as fields for any other data that you'll want to extract from PERSONL. The fields don't have to have the same names in both files, but it's helpful if they do.

With the file structure complete, set up the extraction. At the main menu, choose *File•Design file•Program a file,* type **PROJECT**, press **<Enter>**, then choose *Program form.* At this point you're presented with a blank copy of the form you just designed. Label all the extracted fields with pound signs (#) followed by numbers. Pick any numbers you like, but for this example let's use **#10** for Employee ID and **#20** for First Name.

Now you're ready to "program" the extractions. First, move the cursor to the First Name field, and press **<F6>** to bring up the Formula Editor. Press **<End>** to get past the '#20' that's already there, then type **:XLOOKUP ("PERSONL",#10,"Employee ID","First**



SCREEN 1: Q&A's Formula Editor is the easiest place to enter or change complex programming statements, such as the formula shown here for reading data from another file.

ANTHONY RUSSO

Name",#20) (see **SCREEN 1** for the complete formula). Now press **<F10>** to exit the editor.

This statement tells *Q&A* to find the PERSONL record where the Employee ID field matches what's in PROJECT's field #10, then copy the contents of PERSONL's First Name field into PROJECT's field #20. Make similar entries in each extracted field, changing the last two items in the XLOOKUP statement as appropriate (the first three should remain the same). Press **<F10>** to save your work.

From now on, as soon as you enter a valid employee number in one of your project records and press **<F8>** (Calculate), all the relevant details about that person will be copied from PERSONL to PROJECT.

Reader Tips

Seeing It All in dBASE IV

When you query two related data bases, it's sometimes useful to see records that don't relate. For example, I often query my CUSTOMRS and ORDERS files together to see each customer's orders. When I enter a linking placeholder, such as Link1, beneath each file's CUST_NUMBR field name in the query setup, the only customer names I see are those that are attached to recent orders. But sometimes I also want to see the names of customers who didn't order anything.

I found a solution: To view *all* the records from one of the data bases, you must enter the word *Every* in front of the linking placeholder in the query setup. To display the names of all of my customers, even those who haven't ordered, I enter Every Link1 in CUSTOMRS' CUST_NUMBR field and a simple Link1 in ORDERS'.

Susan James
Chico, California

Send your questions to Data Basics, PC World, *501 Second St. #600, San Francisco, CA 94107; CompuServe 74055,412; MCI Mail 179-3813; 415/442-1891 (fax).* PC World *pays $50 for published questions. Sorry, we cannot acknowledge submitted materials.*

Steve Cummings is the author of Understanding Quicken *(Sybex, Alameda, California, 1990) and a contributing editor for* PC World.

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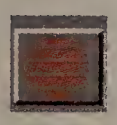

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PUBLISHING & PRESENTATIONS

Expert advice for creating high-impact documents and presentations

by Richard Jantz

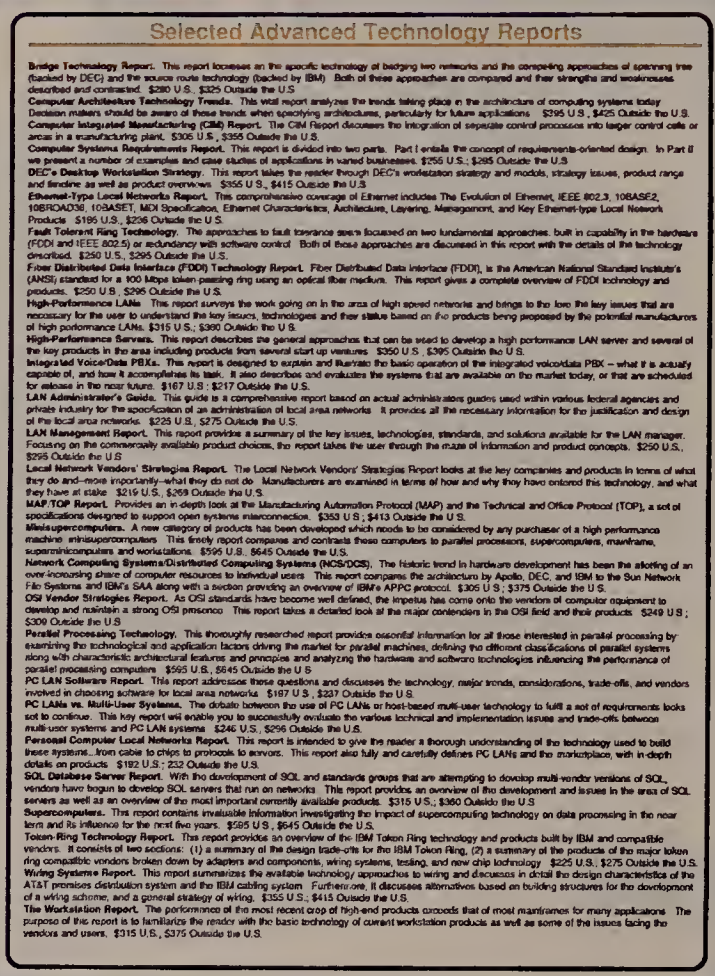
Have you ever published a long list of company products, services, or publications? It's a challenge to produce material that's visually attractive and effective. In order to be a successful sales tool, such a list should be inviting and easy to read.

With these goals in mind, we redesigned a page from a four-panel brochure published by Architecture Technology Corporation (ATC), a Minneapolis network consulting company. Part of the brochure's purpose is to help sell ATC's formidable list of publications. The page we redesigned is an 8½-by-11-inch inside panel that lists titles available for purchase.

The original page is crowded with text and lacks sufficient white space. The result is unnecessarily busy and difficult to read. Although the main heading is set in a second color (pale orange) and the publication titles in boldface, they don't stand out. Worse, the 9-point type used for the body copy is set too wide to be read easily.

To improve the document, we eliminated the black rectangular border to gain more breathing room in the margins, used reversed type (white type on

Before



Selected Advanced Technology Reports

Bridge Technology Report. This report focuses on the specific technology of bridging two networks and the competing approaches of spanning tree (backed by DEC) and the source route technology (backed by IBM). Both of these approaches are compared and their strengths and weaknesses described and contrasted. $280 U.S., $325 Outside the U.S.

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DEC's Desktop Workstation Strategy. This report takes the reader through DEC's workstation strategy and models, strategy issues, product range and timeline as well as product overviews. $355 U.S., $415 Outside the U.S.

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ANTHONY RUSSO

After

We cleaned up the overall design dramatically by changing from a single column (45 picas wide) to two columns (each 20½ picas wide), with ample white space (2½ picas) between.

The thick, black rectangle surrounding the original page makes the other elements look cramped. By eliminating the border and increasing the left margin (from ½ to ⅞ inch), we gave the page much-needed white space.

These condensed and light versions of the standard Helvetica typeface require less space and create more breathing room without sacrificing legibility. We used 9-point Helvetica Bold Condensed in place of 9-point Helvetica Bold for publication titles, and 8-point Helvetica Condensed Light instead of 9-point Helvetica for the remaining body copy, with leading increased from 9 to 10 points.

a solid bar) for the main heading, and then added a single horizontal rule at the bottom to help unify the information on the page. We also used a stronger spot color (solid orange) for the top bar and bottom rule.

To make the document more readable, we changed the one-column format to two columns. This created a more comfortable reading length for each line while spreading white space more evenly across the page. We also added *hanging bullets* (bullets that extend into the left margin) to help each publication title stand out. Finally, in order to economize on space and still provide maximum legibility, we replaced the standard Helvetica typeface used for the body copy with Helvetica Condensed.

If you produce lists of products, parts, and prices, or other materials that require small type, consider adding a space-saving condensed typeface to your publishing toolbox. The result will be a cleaner, tighter document that your clients just may want to linger over.

Send your publishing and presentations questions as well as business document and presentation makeover candidates to Richard Jantz, MCI Mail RJANTZ; 415/442-1891 (fax); or mail them to Publishing & Presentations, PC World, *501 Second St. #600, San Francisco, CA 94107.* PC World *pays $50 for published questions. Sorry, we cannot acknowledge submitted materials.*

Contributing Editor Richard Jantz is a computer consultant in Berkeley, California. Larry Westdal, a graphic designer with Westdal Design Associates in Berkeley, also contributed to this article.

SELECTED ADVANCED TECHNOLOGY REPORTS

- **Bridge Technology Report.** This report focuses on the specific technology of bridging two networks and the competing approaches of spanning tree (backed by DEC) and the source route technology (backed by IBM). Both of these approaches are compared and their strengths and weaknesses described and contrasted. $280 U.S., $325 Outside the U.S.
- **Computer Architecture Technology Trends.** This vital report analyzes the trends taking place in the architecture of computing systems today. Decision makers should be aware of these trends when specifying architectures, particularly for future applications. $395 U.S. $425 Outside the U.S.
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To emphasize the heading, we set it in 16-point reversed Helvetica Ultra Compressed (instead of the original 18-point standard Helvetica Bold), increasing the letterspacing about 100 percent beyond normal. We made the heading stand out by using a stronger spot color (solid orange) for the bar and adding a ½-point black rule below.

In the original, the lack of additional space between list items makes the left side of the page text heavy. Here an additional space (3 points) between items creates a more balanced distribution of white space and a more unified structure.

The hanging bullets, set in 5-point ITC Zapf Dingbats, serve two purposes: They help separate and identify each publication title, and they add a much-needed graphic element to an otherwise text-heavy list.

To unify the design, we added a 3-point horizontal rule to the bottom of the page and printed with spot color.

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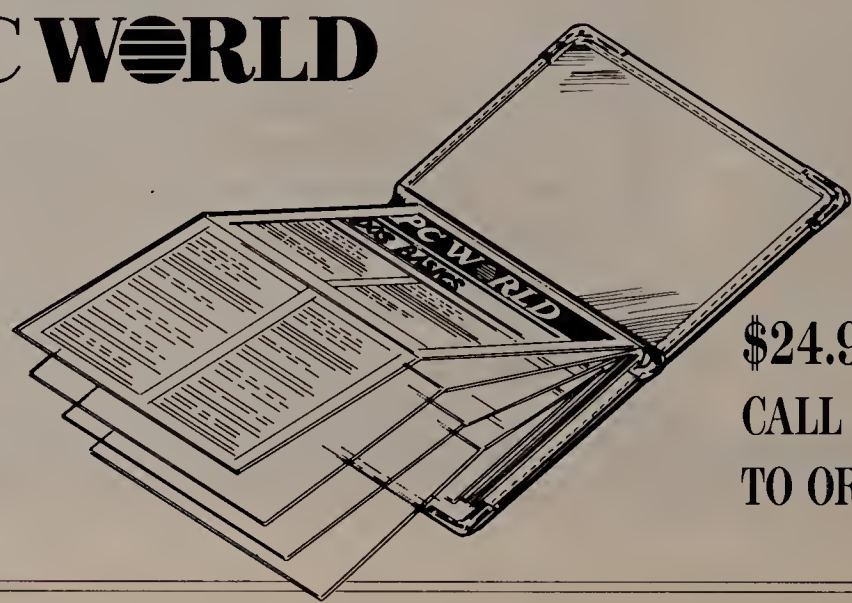

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There's no better way to manage your memory.

> "It's nothing less than a dream come true"
> —*Steve Gibson InfoWorld 8/26/91*

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PC WEEK ANALYST'S CHOICE

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#1

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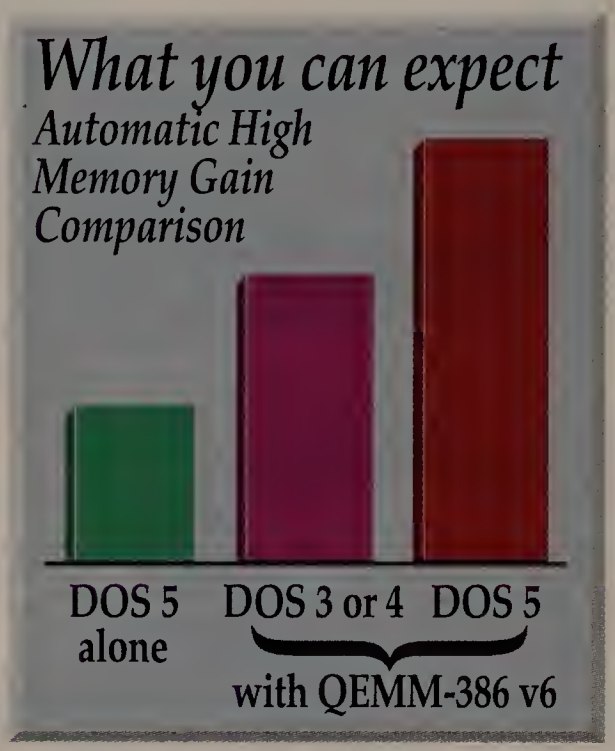

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Our breakthrough 'Stealth' technology makes available areas normally taken up by ROM. Areas that QEMM-386 can use to load memory-hogging drivers and TSRs. Big programs can get the memory they need to run fast and efficiently. And you get to have your TSRs.

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COMMUNICATIONS Q&A

On-line resources for business and professional users

by Judy Heim

Q. *I recently purchased a modem, and it came with* BitCom *and* Procomm Plus *communications packages. Do I need to use both? I use* Windows, *which also has a communications feature. Which one do I use? —Joyce Cupps, Galt, California*

A. You only need one communications program, but getting two is a good deal. *BitCom* is well suited for modem novices, while *Procomm* is more powerful and favored by experienced users. (Terminal, the program that comes with *Windows*, is less powerful than *BitCom* and not suited for much at all.) In other words, if you outgrow *BitCom*, you'll be glad to have *Procomm*.

Because you use *Windows*, you'll want to run your new communications program in that environment. *BitCom* does *Windows* without problems, but *Procomm* requires a special PIF file that ships with the program. After you've installed *Procomm*, move the file PCPLUS.PIF from your \PCPLUS to your \WINDOWS directory. When you create an icon for *Procomm* in Program Manager, make sure you have it launch the PIF file rather than the actual PCPLUS.EXE program.

You might also want to change some of PCPLUS.PIF's settings (if you installed *Procomm* into a directory other than C:\PCPLUS, you'll have to change the Start-Up directory). To make these changes, or simply to examine the settings, load the PIF Editor (you'll find it in Program Manager's Accessories window), and then select *File•Open•PCPLUS.PIF.*

What might you want to change? How *Procomm* operates in the background, for one thing. *Procomm* can transfer files in the background, but this can slow hard disk reading to a crawl. If you'd rather not have *Procomm* working behind the scenes, check the Exclusive box and leave the Background box unchecked.

Q. *What is the best place to find consultants on line? —Harvey Reimer, Lauriston, Oklahoma*

A. I'll assume you mean computer consultants. Check out the Computer Consultant's Forum on CompuServe (**GO CONSULT**), where PC consultant listings are as abundant as business cards in a trade show punch bowl.

To get a list of consultants with the expertise you need, type **6** at the Forum Menu for 'MEMBER directory', **6** again for 'INTEREST', and enter a search string like **novell** or **dbase** when prompted. The service will scroll a list of applicable consultants with descriptions of their special interests and CompuServe ID's.

For more detailed information—albeit on fewer consultants—check out Library 14, 'Looking for...', where you can download consultants' résumés; look for files with a PRO extension. Type **1** for 'BROWSE files', and enter a search string when you're prompted.

Q. *What's flow control, and how do I go about setting it? —Perry Woquain, Washington, D.C.*

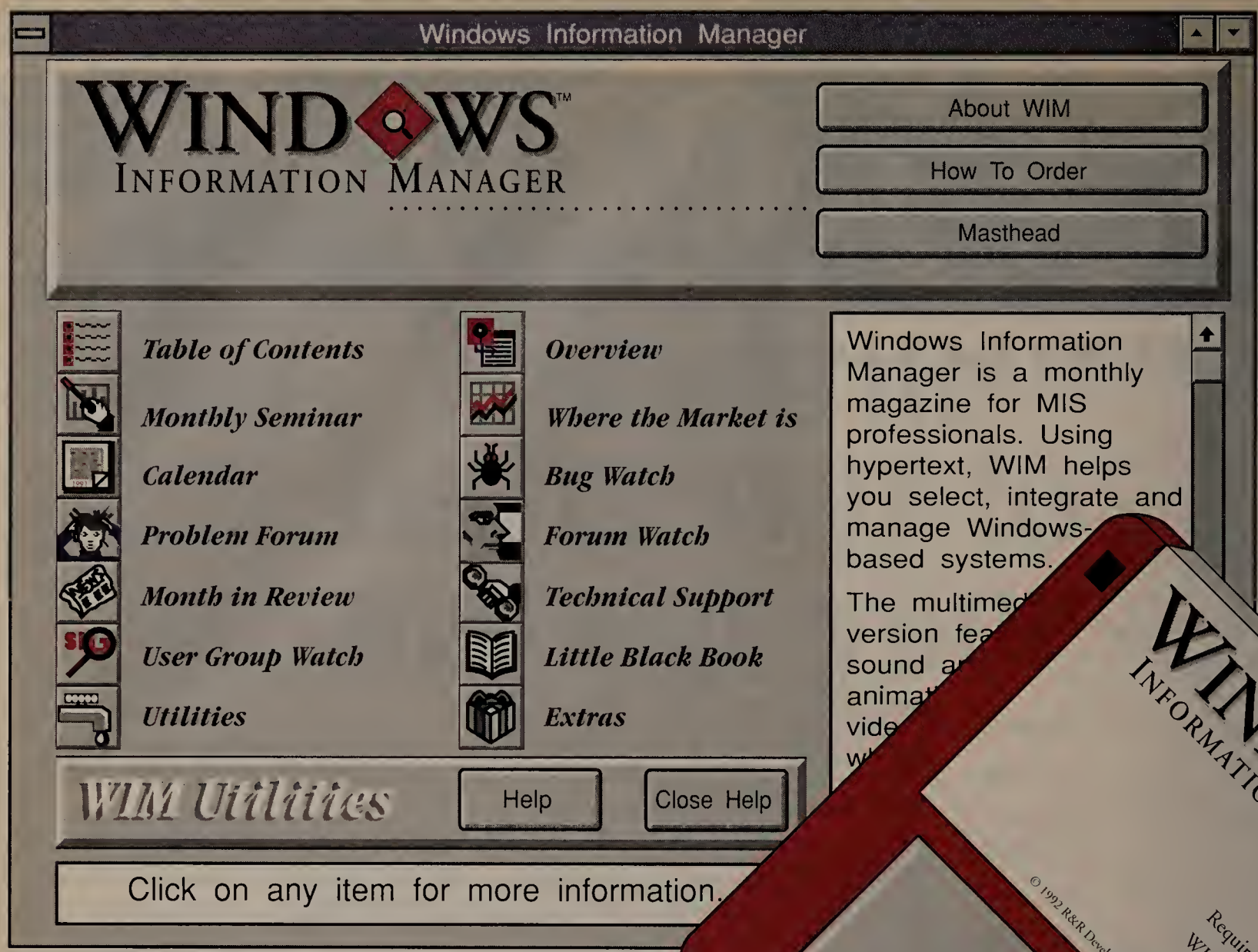
A. If your modem runs at 2400 baud or faster and has built-in error correction and data compression, something must control the flow of data between your modem and your PC. Whether it's hardware or software based, flow control acts like a lock in a dam, preventing the PC from being flooded with too much data too fast.

Both software flow control, called XON/XOFF, and hardware flow control, called Ready to Send/Clear to Send (RTS/CTS) control, are set through options in your communications program, probably on the setup menu. If your modem is fast enough to need flow control, use RTS/CTS; XON/XOFF can inject unwanted characters into binary files as you upload or download them, and should be used only when communicating with a minicomputer or mainframe that demands it.

Send your communications questions to Judy Heim, CompuServe 75300,713; GEnie JUDY.HEIM; MCI Mail 312-7737; Internet 3127737 @MCIMAIL.COM; 415/442-1891 (fax); or mail them to Communications Q&A, PC World, *501 Second St. #600, San Francisco, CA 94107.* PC World *pays $50 for published questions. Sorry, we cannot acknowledge submitted materials.*

Judy Heim is a contributing editor for PC World.

ANTHONY RUSSO



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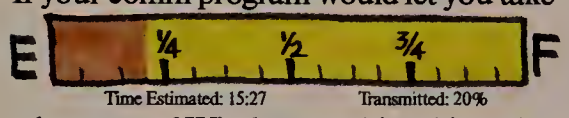
How To Get Into PC Communications Without Jumping Out Of Windows

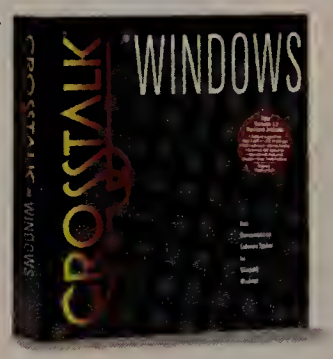
You forget how wonderful Windows™ is until you have to exit it to transfer a file.

Since most communications software won't work in Windows, you're left sitting on your hands watching a "gas gauge" as your file transfer crawls from start to finish. If your comm program would let you take



advantage of Windows multi-tasking, then you could minimize it to a simple icon while you carried on with something else (like the spreadsheet you promised your boss an hour ago).

Well, with Crosstalk® for Windows you can.



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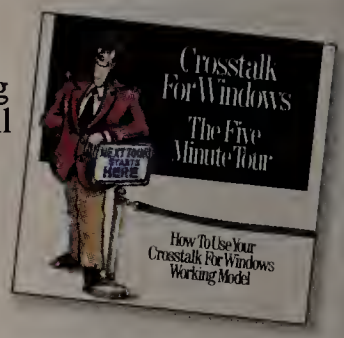

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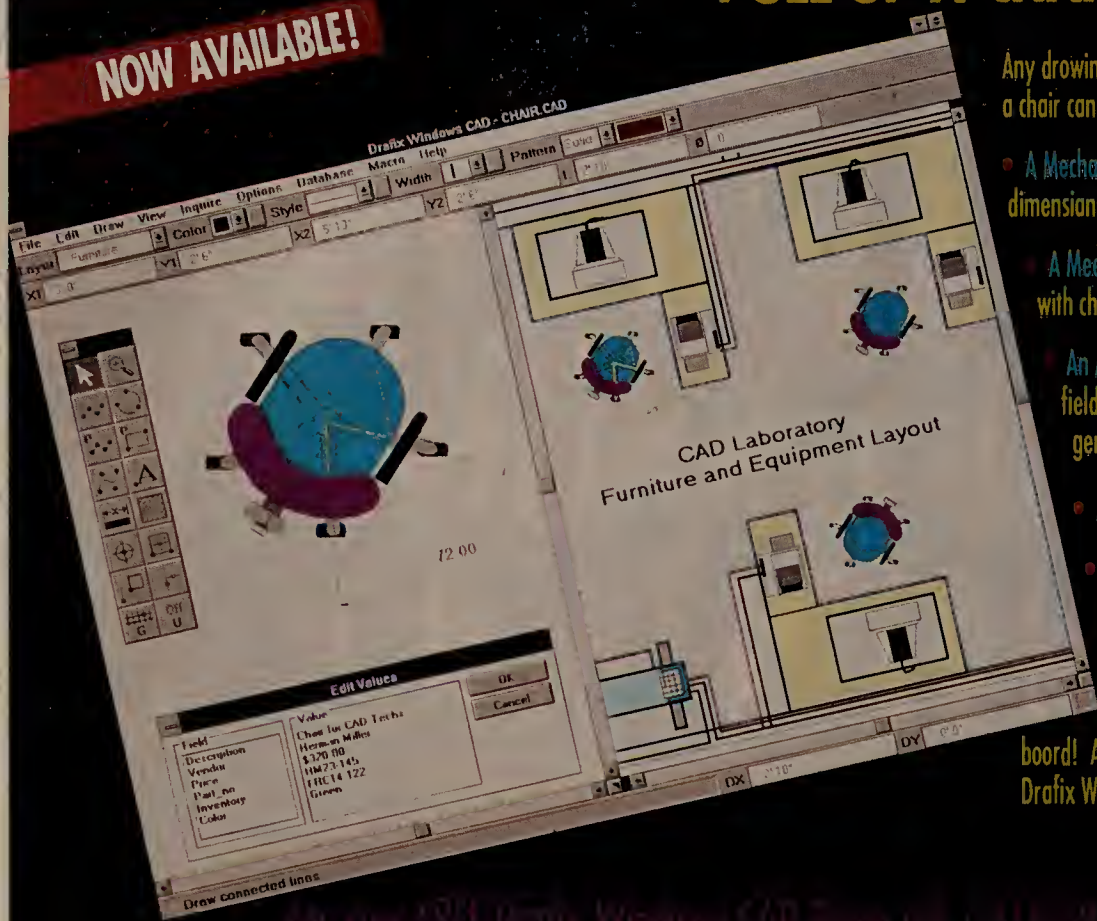

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WINDOWS WORKSHOP

Practical answers to your questions about Windows

by Jesse Berst and Scott Dunn

Uninstalling Programs Completely

Q. *How do you uninstall* Windows *applications? Where do you look? What do you erase? What* don't *you erase?*

Alex Roberts
Bakersfield, California

A. For starters, don't erase *anything* if you're unsure of what you're doing. Back up your hard disk (or at least all your *Windows* files and applications) and then proceed as noted here.

Uninstalling *Windows* applications can be a pain. Few user manuals document the steps (for obvious marketing reasons), and many programs slip commands into *Windows'* myriad system files, or worse, pack the disk with hidden files.

If you want to remove a program icon but not the program, simply select the icon, press <**Delete**>, and type **Y**. Removing the program itself is a little more complicated.

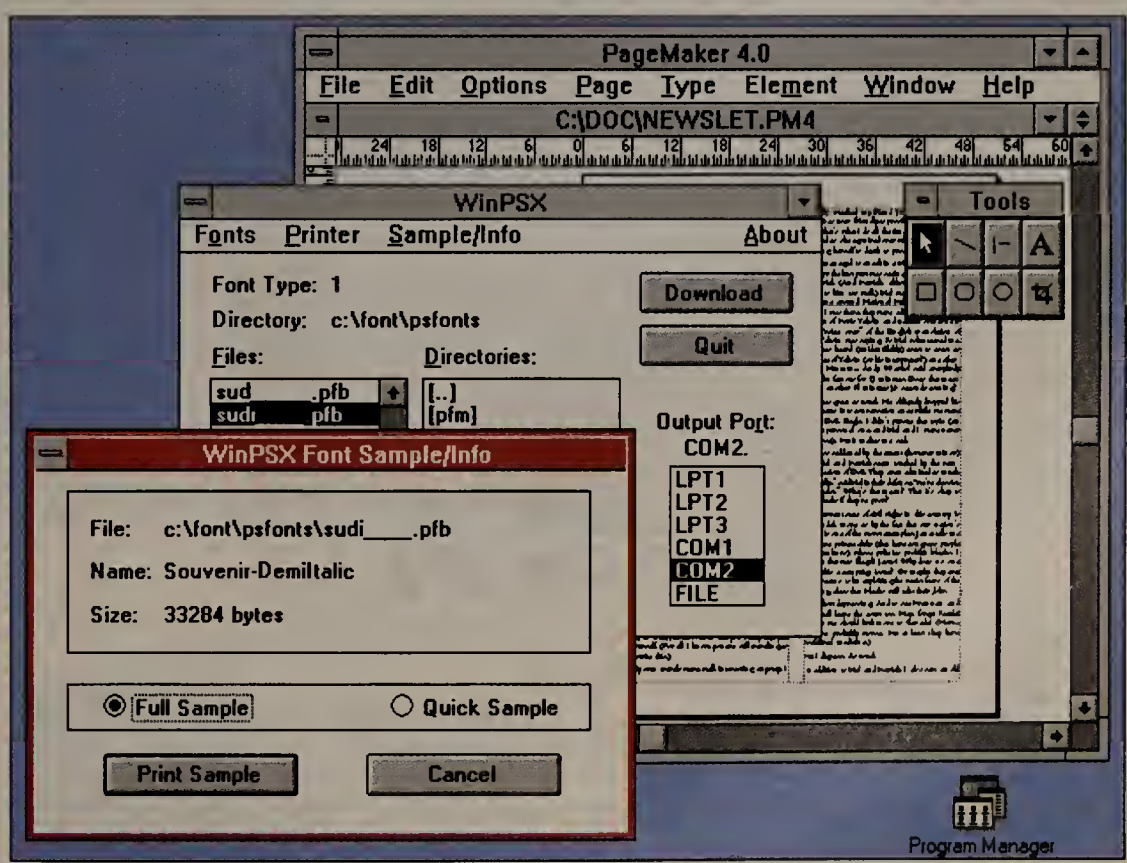
1. Make copies of AUTOEXEC.BAT, CONFIG.SYS, WIN.INI, SYSTEM.INI, and PROGMAN.INI before you change anything.

2. In the appropriate program group, highlight the program's icon and select *File•Properties* to reveal the name of its executable file, which will have a COM, EXE, or BAT extension. If the program is installed in its own directory, the directory's name will precede the executable file's name on the Command line. Jot down this information and delete the icon. If you're removing a DOS program and a PIF file is listed, load *Windows'* PIF Editor and open the PIF file to get this information.

3. If the program has its own directory, run File Manager and delete that directory's contents.

4. From File Manager, select *File•Search* and enter the name of the executable file minus its extension, such as WINGIF*.*. Delete any program files your search turns up (EXE, COM, DLL), all program-specific initialization files (INI, INF, GRP), help and data files (HLP, TXT, WRI, 1ST, DOC, DAT), and subdirectories. Even if the program was in its own directory, don't be surprised if some files have installed themselves in your *Windows* directory. Most files *should* have similar names—WINGIF.EXE, WINGIF.HLP, WINGIF.DLL. However, not all programs follow this scheme, and others, such as *Corel Draw,* come with multiple EXE files. When in doubt, check the program's user manual or call the vendor for help.

Windows Toolbox



Downloading PostScript soft fonts to your printer is a breeze with WinPSX. This nifty little program lets you pick only the fonts you need from a dialog box or create custom font groups that you can download quickly by clicking an icon. The Sample/Info window shown here even translates font file names into English, and it can generate a print sample. Best of all, WinPSX is free. Look for WINPSX.ZIP in CompuServe's WINADV forum.

ANTHONY RUSSO

5. Select *File•Run* and type **SYSEDIT** to display AUTOEXEC.BAT, CONFIG-.SYS, WIN.INI, and SYSTEM.INI in four overlapping windows. Delete all lines that load the program, its drivers and fonts, and any related files. In WIN.INI, make sure you check the load= and run= statements, the [Extensions] section, and any section named after the program. Save your changes, exit *Windows*, and reboot your computer.

6. If error messages appear or the program's icon pops up when you load *Windows*, sift through the [Groups] section of PROGMAN.INI for suspicious entries. Check *Windows'* subdirectory and its SYSTEM subdirectory for similarly named SYS or DLL files and rename them (just in case you're wrong). Exit *Windows*, reboot the system, and see what happens. If everything runs normally, delete the renamed files. You're rid of the program at last!

Fast-Launch Multiple Applications

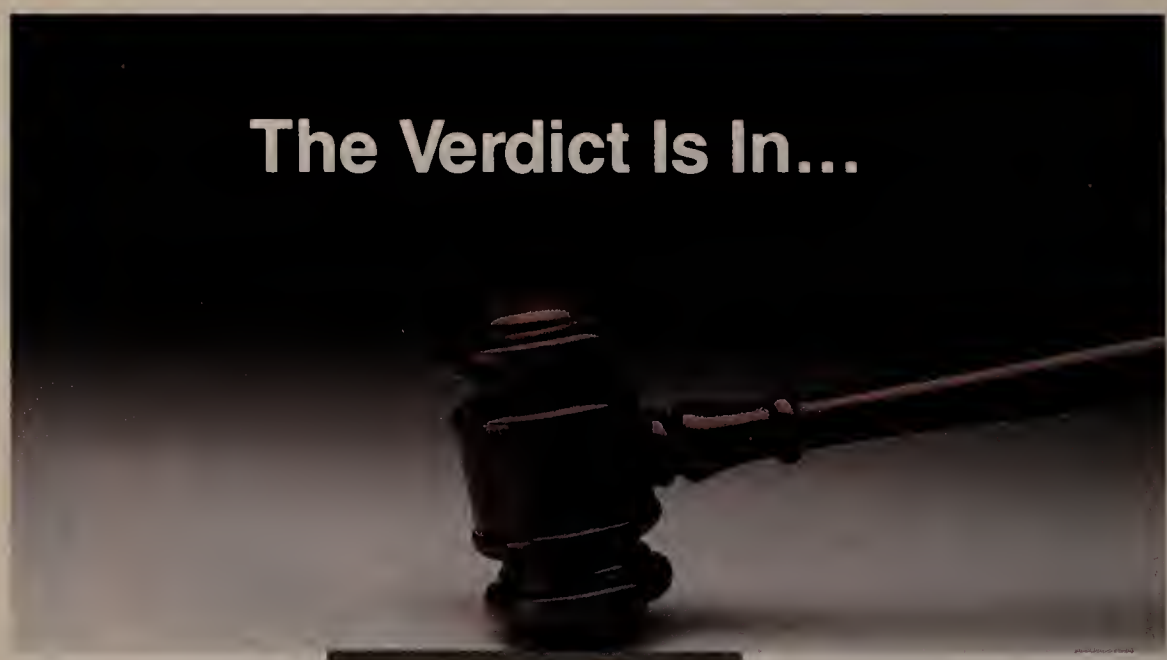
Q. *In past columns you've mentioned utilities that let you launch multiple applications with one icon. I don't have access to these utilities, and I'm on a very tight software budget. Is there any way to make* Windows *launch groups of programs without a utility?*

Michael Siever
San Francisco

A. What, and put all those utility programmers out of business? The answer to your question is no—but you can speed up the launching of multiple applications. First off, it helps to create a program group that holds all the applications that you want to launch regularly. Then hold down the **<Shift>** key and double-click one program icon after another. Holding <Shift> overrides the Minimize on Use setting on the Options menu (if checked) and puts the icons on the desktop. You can hop to the first program clicked by pressing **<Alt>-<Tab>**, select any program from the Task List by pressing **<Ctrl>-<Esc>** and then pressing **<Enter>**, or simply double-click the desired program icon. Any of these methods is fast and beats going back to Program Manager to start each new application.

Send your questions to Windows Workshop, PC World, *501 Second St. #600, San Francisco, CA 94107-1431; CompuServe 74055,412; MCI Mail 179-3813; or 415/442-1891 (fax).* PC World *pays $50 for published questions. Sorry, we cannot acknowledge submitted materials.*

Jesse Berst is a contributing editor for PC World. *He and Scott Dunn are coauthors of* 101 Windows Tips *(Peachpit Press, Berkeley, California, 1991).*



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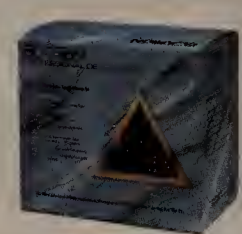

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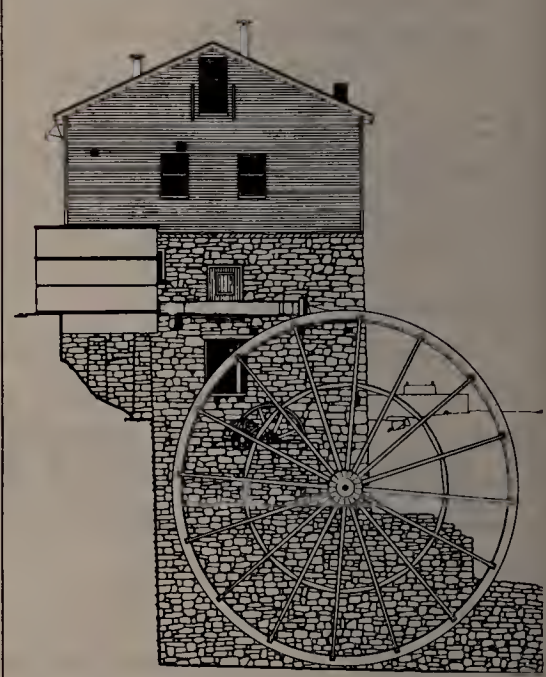

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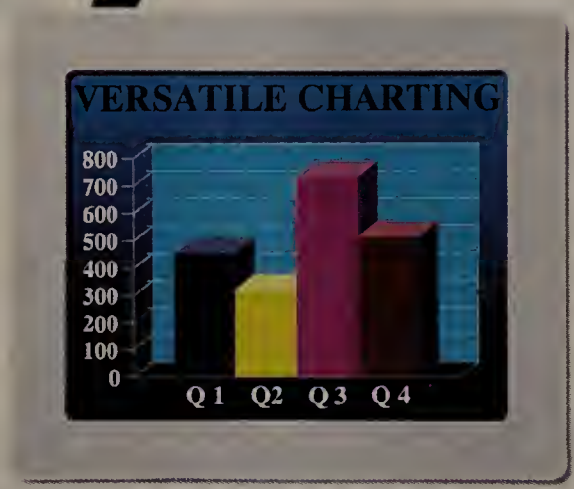

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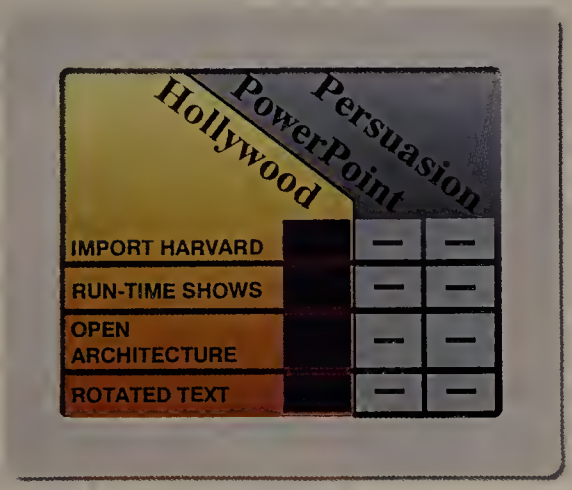

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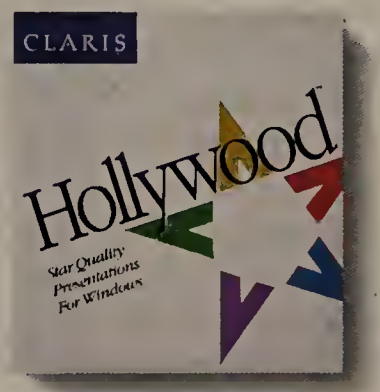

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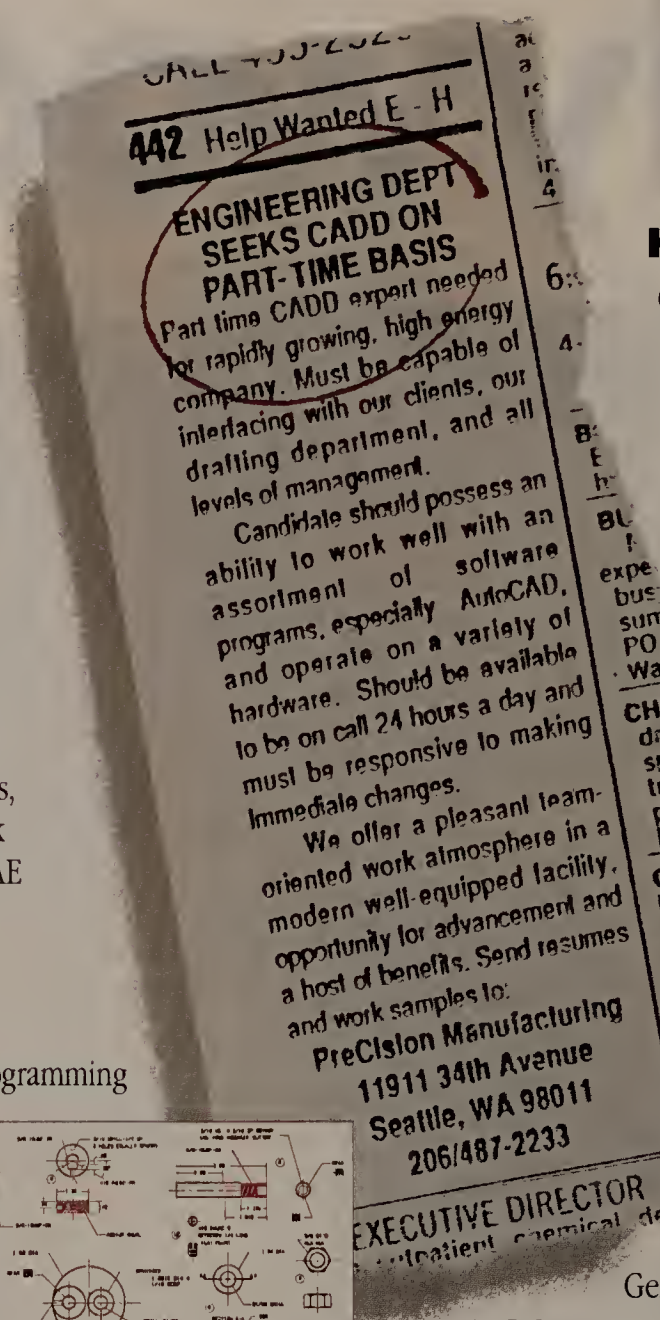

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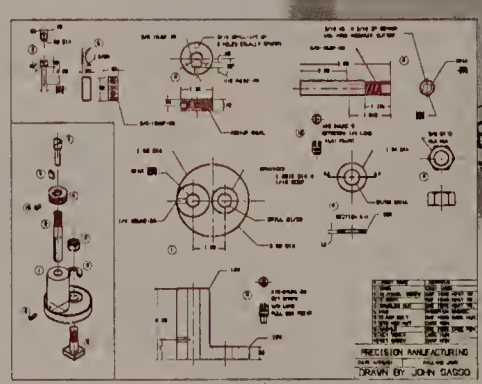

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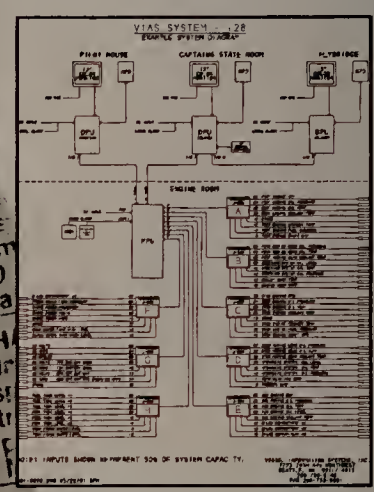

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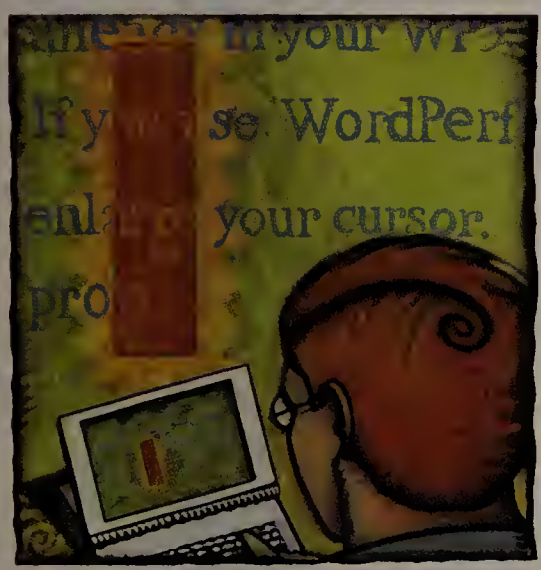
USER GROUP TIPS

Helpful hints from members of the nation's user groups



TROY THOMAS

WordPerfect Cursor Grows on Command

Do you have trouble finding your cursor? If you're using a laptop, it's likely.

If you use *WordPerfect 5.1*, you've got a way to enlarge your cursor. *WordPerfect* comes with a program called CURSOR.COM that's probably already in your WP51 directory. To use it, simply type **CURSOR** at the DOS prompt (if your WP51 directory isn't in your AUTOEXEC.BAT's PATH statement, you'll want to move CURSOR.COM to a directory that is). A grid will appear on your screen. As you move around with your cursor keys, your cursor will change size and vertical position. When you find a cursor you like, make a note of the grid letters. Press **<Enter>** to exit.

Both DOS and *WordPerfect* will display your new cursor until you reboot or run another application. You can reshape it again by passing its grid position to CURSOR.COM at the DOS prompt. For instance, to use the cursor at the AH position, type **CURSOR/AH**. You can put this command in your AUTOEXEC.BAT file after the PATH statement to bring up your new cursor every time you boot.

Elena Beck
Los Angeles Computer Society

A Bigger Windows Environment

Sometimes it seemed that no amount of RAM was enough. Even with 8MB, I still got out-of-memory errors when I tried to run large applications in *Windows*. Then I discovered the problem.

When *Windows* says it's out of memory, and you know there's plenty of RAM available, what's really lacking might be environment space. When DOS boots, it reserves a small amount of memory (the default is 128 bytes) for environment variables. If *Windows* needs to write an environment variable and there's no room to do it, you will get a misleading out-of-memory message. But it's not more megabytes you need, only a few bytes in the right place.

To give your environment 512 bytes, add the command **shell=c:\command.com /p /e:512** to your CONFIG.SYS file. When you reboot, you'll have a bit less conventional memory but much more environment space.

Cindy Speer
Mile High Computer Resource Organization

Shortcut to Remove All Shortcuts in Quattro Pro

You can assign a <Ctrl>-*alpha* keyboard shortcut to any *Quattro Pro* menu item. In fact, the program comes with a selection of shortcuts already assigned (such as <Ctrl>-C for Copy). If you don't like your shortcuts, you can remove them all quickly and easily.

But first, a warning: These keystrokes remove every shortcut in your MU (menu) file, and they do it without any noticeable warning. There's no way to undo this command, so make a copy of your MU file before issuing it.

To remove all shortcut keys, highlight any option on any menu, and press **<Ctrl>-<Enter>**, then **<Delete>**, then **<Ctrl>-<Enter>** and **<Delete>** again. These changes will affect your current MU file immediately—and irreversibly.

Sandeep H. Shah
PC World Readers' Group

Endless PageMaker Fonts

I've been using *PageMaker 4.0* for a while now and love the bundled *Adobe Type Manager*. But after downloading and installing more than 200 fonts, I've found that *PageMaker*'s Type • Font command can't show more than 27 fonts on a standard VGA system.

It's possible, however, to see all the installed fonts by selecting *Type • Type specs*. This brings up a dialog box for setting all your type options, including font. Only this time, all your fonts are available on a scrollable list.

Tej K. Dhawan
Kansas City IBM-PC User Group

User group members—please submit your tips to User Group Tips, PC World, *501 Second St. #600, San Francisco, CA 94107; CompuServe 74055, 412; MCI Mail PC World Editorial; or 415/442-1891 (fax). Include your phone number and the name of your group. We pay $50 and throw in a* PC World *T-shirt for each tip we use.*

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Edited by Brett Glass

Reducing a Paradox

When you delete records from a *Paradox* table, you don't regain even one byte of disk space! *Paradox* never physically deletes these records; it simply marks "deleted" records as unused. If you add more records, *Paradox* will reuse the space, but if you add fewer records than you've deleted, you're left with a bigger file than you need. Fortunately, there's an undocumented way to recover this wasted space.

When you restructure a table, say, to change, add, or delete fields, *Paradox* rewrites and compacts it. Because the restructuring feature doesn't check to see if you've actually changed anything, it provides a quick and easy way to compress a table.

I wrote a PAL script named COMPRESS.SC [see **LISTING 1**], that squeezes the table currently being viewed by removing the excess space left by deleted records. To run it, bring up the file in question, then select *Scripts•Play*, type **COMPRESS**, and press <**Enter**>. Your hard disk will run for a while, then COMPRESS will beep and tell you how much of the unused space you've regained.

Note, however, that if you want to delete *all* the records in a table, you should use the EMPTY function instead of deleting all the records and compressing. EMPTY simply re-creates the disk file with no entries, freeing all the space that held the records.

David Babcock
San Jose, California

Group Compare

DOS's COMP program compares a pair of files and tells you if they're the same, but most users don't know that it can also compare several pairs of files in this way. It's all done with directory names and wild cards.

For instance, imagine that you've backed up a directory called TEXT to a floppy. If you type **COMP TEXT A:** at the DOS prompt, COMP will check each file in TEXT against a file with the same name on drive A:, if such a file exists. Using a wild card in the first argument narrows the list; **COMP TEXT*.EXT A:** compares every file in TEXT that has the extension EXT with its counterpart on drive A:. If the second argument has a wild card, it tells COMP to change the names of the files specified by the first argument in some way before looking for files to compare. For instance, **COMP TEXT A:*.BAK** takes each file from TEXT and tries to compare it to a file on drive A: with the same name and the extension BAK.

Bert Halverson Jr.
Muldrow, Oklahoma

Help for 1-2-3 Macros

To make life easy for your *1-2-3* users, try making a menu of the macros available for use in a spreadsheet or spreadsheet template. But for some people even this isn't enough; they look at the menu and say Help! So I wrote a macro that lets them bring up help screens

```
;  COMPRESS.SCÑPAL script to compress current table
;                 By Dave Babcock
;
;  Make sure there is a current table
IF NIMAGES() = 0 THEN
  MESSAGE "No table to compress!"
  BEEP SLEEP 5000
  QUIT
ENDIF
;  Complete any pending operation and return to main mode
IF SYSMODE() <> "Main" THEN
  DO_IT!
ENDIF
;  Save size of current table
OldSize = FILESIZE(TABLE()+".DB")
;  "Restructure" table with no changes to recover space
MENU {Modify} {Restructure} SELECT TABLE() TYPEIN TABLE()
{DO-IT!}
;  Report space saved by compaction
NewSize = FILESIZE(TABLE()+".DB")
MESSAGE STRVAL(OldSize - NewSize) + " bytes saved!"
BEEP SLEEP 5000
```

LISTING 1: This simple PAL program shrinks a Paradox data base by removing "deleted" records, which still take up space.

ANTHONY RUSSO

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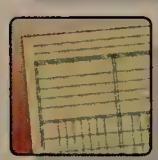

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```
      AA     AB     AC     AD     AE     AF     AG
1
2  Help is available on all menu choices. Hold down
3  <ALT> and press "H", then use the arrow keys to move
4  to the cell directly to the left of the menu choice
5  that you want help for. Once there, type "X" and
6  press <Enter> to go to the help screen for that choice.
7
8
9            <Alt+R>eturn to menu
10           <Alt+P>rint report
11           <Alt+S>ave worksheet with current data
12
```

FIGURE 1: This diagram shows a spreadsheet menu with a built-in help system.

when they need explanations of the available choices.

I usually create a menu in the format shown in **FIGURE 1**. Then I assign the range name MENU to a cell above, and to the left of, the top of the menu. I assign the range name **\0** (backslash zero) to a macro elsewhere on the worksheet that reads **{GOTO}MENU~**. Since \0 executes automatically when the spreadsheet is retrieved, users always start at the menu.

Before creating the help menu, I assign names to the cells immediately to the left of the menu options; in this particular example, I'd name cells AA9, AA10, and AA11 **MENUX**, **PRINTX**, and **SAVEX**, respectively. I'd then go to three other out-of-the-way worksheet areas, type the actual help text in those locations, and name those ranges **MENUH**, **PRINTH**, and **SAVEH**.

Finally, I would create a macro named **\H**, as shown in **FIGURE 2**, which displays the help text for any menu entry that the user has marked with an *X* (enter each numbered line into a separate cell; do not enter the line numbers). The user is taken to the appropriate help screen and can read it until he or she presses <Enter>.

Bill Hartwell
Lyndonville, Vermont

BASIC ID Number Generator

When you or your staff enter data into a computer, it's easy to mistype or misread an ID or account number. Such errors can cost your organization dearly—especially if funds find their way into (or out of) the wrong account. These two *QuickBasic*/QBASIC programs [**LISTING 2** and **LISTING 3**] help you prevent this problem by generating and then verifying account numbers with check digits. Besides guarding against typos, this technique can help protect you from fraud; nine times out of ten it will catch a fabricated ID number.

MAKE_ID.BAS adds a sixth digit to any five-digit number you give it. (It does this by adding the first, third, and fifth digits to twice the second and fourth digits and concatenating the

```
1. {GOTO}MENU~
2. {?}~
3. {IF @UPPER(MENUX)="X"}{GOTO}MENUH~Press
     <Enter>{?}{ESC}{GOTO}MENU~/REMENUX~
4. {IF @UPPER(PRINTX)="X"}{GOTO}PRINTH~Press
     <Enter>{?}{ESC}{GOTO}MENU~/REPRINTX~
5. {IF @UPPER(SAVEX)="X"}{GOTO}SAVEH~Press
     <Enter>{?}{ESC}{GOTO}MENU~/RESAVEX~
6. {QUIT}
```

FIGURE 2: This macro drives the help system for the spreadsheet in FIGURE 1. Enter each numbered line into a separate cell; do not enter the line numbers.

```
'Program MAKE_ID.BAS
DECLARE SUB GenID (ID$, Flag%)
START:
 INPUT "Enter a 5 digit number: ", ID$
 CALL GenID(ID$, Flag%)
 IF Flag% = 1 THEN
   PRINT "The ID number is: "; ID$
   SYSTEM
 ELSE
   PRINT "Invalid number"
   GOTO START
 END IF

SUB GenID (ID$, Flag%)
 ' If ID$ is a 5-digit number, add a
 ' check digit to make it a valid
 ' 6-digit ID number and set Flag%
 ' to 1. If ID$ is not valid, set
 ' Flag% to 0.
 DIM D(5) AS INTEGER
 Flag% = 0
 IF LEN(ID$) <> 5 THEN EXIT SUB
 FOR I% = 1 TO 5
  A$ = MID$(ID$, I%, 1)
  IF A$ < "0" OR A$ > "9" THEN EXIT SUB
  D(I%) = VAL(A$)
 NEXT I%
 'Calculate last digit from first 5
 RESULT% = D(1) + D(2) * 2 + D(3)
 RESULT% = RESULT% + D(4) * 2 + D5
 RESULT% = RESULT% MOD 10
 ID$ = ID$ + CHR$(ASC("0") + RESULT%)
 Flag% = 1
END SUB
```

LISTING 2: Run this program through QuickBasic or QBASIC to generate ID or account numbers with check digits that prevent errors.

```
'Program CHECK_ID.BAS
DECLARE SUB CheckID (ID$, Flag%)
Flag% = 0
DO UNTIL Flag% = 1
 INPUT "Enter ID Number: ", ID$
 CheckID ID$, Flag%
 IF Flag% = 0 THEN
   PRINT "Invalid ID number! Re-enter: "
 END IF
LOOP
PRINT "ID number "; ID$; " is valid."
SUB CheckID (ID$, Flag%)
 ' Set Flag% to 1 if ID$ contains a
 ' valid 6-digit ID number. Otherwise,
 ' set Flag% to zero.
 DIM D(6) AS INTEGER
 Flag% = 0
 IF LEN(ID$) <> 6 THEN EXIT SUB
 FOR I% = 1 TO 6
  A$ = MID$(ID$, I%, 1)
  IF A$ < "0" OR A$ > "9" THEN EXIT SUB
```

(continues)

LISTING 3: Use this program to see if a MAKE_ID-generated check digit is correct.

```
  D(I%) = VAL(A$)
 NEXT I%
 'Calculate last digit from first 5
 Check = D(1) + D(2) * 2 + D(3)
 Check = Check + D(4) * 2 + D5
 Check = Check MOD 10
 IF Check = D(6) THEN Flag% = 1
END SUB
```

LISTING 3 continued

least-significant digit of the sum to the original number.) CHECK_ID.BAS tests the validity of a MAKE_ID.BAS-generated ID number by running the first five digits through the same formula, then comparing the result to the sixth digit of the number being tested.

Bill Hopkins
Marble Hill, Missouri

Editor's note: Check digits have been used for many years in credit card numbers, supermarket bar codes, and even the ISBN numbers found on books. If you want even greater security, you can create ID numbers with multiple check digits—or with check characters that can take the form of letters or digits. I've enhanced Mr. Hopkins's code, without changing the underlying algorithm, to be more bulletproof and to work with arrays rather than simply with character strings. You can use these utilities as is or copy the GenID and CheckID subroutines into your own BASIC code.

Back to Printing Backward

A printing error caused readers some understandable problems with Jerry L. Stern's recent tip, "Run Your Printer Backward" (*Star-Dot-Star*, January 1992). The tip was intended for *WordPerfect* users with printers that stack pages right side up, resulting in documents that end up in the wrong order, with their last page on top.

Mr. Stern's tip involved a macro, REVPRINT, that prints from the last page of a document to the first, so the printout is stacked in the correct order in the printer bin. **FIGURE 3** shows the correct listing.

REVPRINT uses macro-specific commands, so you can't create it by simply recording keystrokes; you must use the macro editor. To get to this editor, press **<Home>**, then **<Ctrl>-<F10>**. At the 'Define macro' prompt, type **REVPRINT** and press **<Enter>**; at the 'Description' prompt, type **Prints backward** and press **<Enter>** again. You're now ready to create the macro.

The first command, {DISPLAY OFF}, is already there. Get past it by pressing **<Right>** and **<Enter>**. To enter the commands {Home}, {Down}, and {Page Up} into the macro, press **<Ctrl>-V** followed by the appropriate command key. To enter the {WHILE}, {END WHILE}, and {SYSTEM} commands, press **<Ctrl>-<Page Up>**, select the command on the resulting pop-up list, and press **<Enter>**. Insert {Print} by pressing **<Shift>-<F7>**. Type the remainder of the text as it appears. When the macro is finished, press **<F7>** to exit the macro editor. To run the macro, press **<Alt>-<F10>**, type **REVPRINT**, and press **<Enter>**.

PC World apologizes for the error.

Have you come up with a macro, batch file, short program, or general tip that

```
{DISPLAY OFF}
{Home}{Home}{Down}
{WHILE}{SYSTEM}page~>l~
{Print}2{Page Up}
{END WHILE}
{Print}2
```

FIGURE 3: This WordPerfect macro prints a document's pages backward, so they appear in the correct order in the bin of a printer that stacks its output face up.

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PC WORLD

Instant Reference Card #22

For use with PC World Instant Reference Card Portfolio

BASICS: WORD FOR WINDOWS 2.0

You can choose a *Word for Windows 2.0* command by selecting it from a menu via the keyboard or a mouse, typing a keyboard shortcut such as <Ctrl>-C for Copy, or clicking on a button in the Toolbar or Ribbon (third and fourth lines from the top of the screen if you have turned them on from the **V**iew menu). You finish most tasks by clicking OK or pressing <Enter>. Refer to Instant Reference Card #16 in the September 1991 issue for other *Word for Windows* commands.

USING THE TOOLBAR

The buttons on the Toolbar provide easy, mousable access to common tasks. To use the Toolbar, click on the button for the task you need to do.

Button	Task	Keyboard
	Start new document	**F**ile•**N**ew
	Open document	**<Ctrl>-<F12>**
	Save document	**<Shift>-<F12>**
	Cut selected text to Clipboard	**<Ctrl>-X** or **<Shift>-<Delete>**
	Copy selected text to Clipboard	**<Ctrl>-C** or **<Ctrl>-<Insert>**
	Paste text from Clipboard	**<Ctrl>-V** or **<Shift>-<Insert>**
	Undo last action	**<Ctrl>-Z** or **<Alt>-<Backspace>**
	Create numbered list	**T**ools•**B**ullets and Numbering•Numbered **L**ist
	Create bulleted list	**T**ools•**B**ullets and Numbering•**B**ullets
	Unindent paragraph back to previous tab stop	**<Ctrl>-M**
	Indent paragraph to next tab stop	**<Ctrl>-N**, then drag across sample
	Create table	**T**able•**I**nsert Table, type number of **C**olumns and **R**ows
Then drag across sample		
	Create text columns	Format•**C**olumns, type number of columns, choose other options
Then drag across frame area		
	Create frame	**I**nsert•**F**rame, **Y**es if you're prompted to change to Page Layout view, drag across area frame will cover
Then drag across frame		
	Create drawing	**I**nsert•**O**bject, select *Microsoft Drawing*
	Create chart	**I**nsert•**O**bject, select *Excel Chart*
	Print envelope	**T**ools•Create **E**nvelope
	Check spelling	**<F7>**
	Print document	**<Ctrl>-<Shift>-<F12>**
	Show entire page in editable view	**V**iew•**P**age Layout, then **V**iew•**Z**oom•**W**hole Page
	Return to normal editing view	**V**iew•**N**ormal, then **V**iew•**Z**oom•**1**00%
	Show text from left to right margin in editable view	**V**iew•**Z**oom•**P**age Width

Fold Here

SELECTING TEXT

Task	Keyboard	Mouse
Select document	**<Ctrl>-<NumPad 5>**	**<Ctrl>**-click in left margin
Select current word	**<F8>** twice	Double-click
Select current sentence	**<F8>** three times	**<Ctrl>**-click
Select current paragraph	**<F8>** four times	Double-click in left margin
Select current section	**<F8>** five times	
Select column	Move to a corner, **<Ctrl>-<Shift>-<F8>**, move to opposite corner	Move to a corner, hold down *right* button, move to opposite corner

CHANGING THE VIEW

The best view for designing a document may not be the best for editing it. You change the way your document looks on screen to suit your current task.

Toggle draft view	**V**iew•**D**raft
Show page view	**V**iew•**P**age Layout
Return to normal view	**V**iew•**N**ormal
Display/hide Ribbon	**V**iew•Ri**b**bon
Display/hide Ruler	**V**iew•**R**uler
Display/hide Toolbar	**V**iew•**T**oolbar
Other options	**T**ools•**O**ptions•**V**iew, set available options
Customize zoom	**V**iew•**Z**oom, select or enter custom magnification

EDITING SHORTCUTS

Delete next word (no selection)	**<Ctrl>-<Delete>**
Delete previous word	**<Ctrl>-<Backspace>**
Search for text/formatting	**E**dit•**F**ind, type text/select formatting to find, select options
Replace text/formatting	**E**dit•**R**eplace, type text/select formatting to find, type new text, select options
Move/copy selected text	**<F2>**/**<Shift>-<F2>**, move cursor to new location, **<Enter>**
Increase/decrease font size	Select text to change, **<Ctrl>-<F2>**/**<Ctrl>-<Shift>-<F2>**
Insert glossary entry	Type glossary name, **<F3>**
Change case	Select text to change, **<Shift>-<F3>**
Repeat last action	**<F4>**
Repeat last search	**<Shift>-<F4>**
Go to page	**<F5>**, then type page number
Return to starting place	**<Shift>-<F5>**
Find synonym	**<Shift>-<F7>**
Sort by paragraph	**T**ools•Sor**t**ing, select options, OK

WORKING WITH GRAPHICS

Add graphic	**I**nsert•**P**icture, select directory, choose file name
Edit graphic	Double-click graphic to open Draw, a separate drawing program that comes bundled with *Word*
Size graphic	Click on graphic, drag one of eight handles
Crop graphic	Click on graphic, hold **<Shift>** and drag one of eight handles
Move graphic	Click on graphic, drag

Note: The Clipart directory that comes with *Word for Windows 2* contains over 40 graphic images you can insert into a *Word* document. *Word* can read graphic files in a number of file formats, including PCX, EPS, TIF, and BMP. How well Draw can edit any given graphic file depends on that file's format.

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ADVANCED: WORD FOR WINDOWS 2.0

USING THE RIBBON

The buttons on the Ribbon provide easy, mousable access to common formatting options. To use the Ribbon, click on the button for your desired option.

Button	Task	Keyboard
Normal ↓ Choose style	Select a style	**<Ctrl>-S**, choose style
Futura ↓ Choose font	Select font name	**<Ctrl>-F**, choose font
7 ↓ Select or enter type size	Select font size	**<Ctrl>-P**, select or enter type size
B	Bold text	**<Ctrl>-B**
I	Italicize text	**<Ctrl>-I**
U	Underline text	**<Ctrl>-U**
	Left-align text	**<Ctrl>-L**
	Center text	**<Ctrl>-E**
	Right-align text	**<Ctrl>-R**
	Full justify text	**<Ctrl>-J**
Click on position	Left tab	**<Ctrl>-<Shift>-<F10>**, position cursor, **1 <Insert>**
Click on position	Centered tab	**<Ctrl>-<Shift>-<F10>**, position cursor, **2 <Insert>**
Click on position	Right tab	**<Ctrl>-<Shift>-<F10>**, position cursor, **3 <Insert>**
Click on position	Decimal tab	**<Ctrl>-<Shift>-<F10>**, position cursor, **4 <Insert>**
¶	Show nonprinting characters	**<Ctrl>-<Shift>-8**

PROOFING

Check spelling of entire document	**T**ools•**S**pelling, select a command for each word not found in dictionary
Check spelling of a word	**<F7>**
Replace word with synonym	**<Shift>-<F7>**, select a meaning (if needed), select a synonym, **R**eplace
Add hyphen within a word that will print only if it's at the end of a line	**<Ctrl>-<Hyphen>**
Add non-breaking hyphen	**<Ctrl>-<Shift>-<Hyphen>**
Add non-breaking space	**<Ctrl>-<Shift>-<Spacebar>**
Hyphenate document	**T**ools•**H**yphenation, select option, OK

USING MACROS

The Macro Recorder records and stores multiple commands for repeated use. The only mouse movements that the Macro Recorder recognizes, however, are command selections from the menus and button bars.

Start recording a macro	**T**ools•**R**ecord Macro, type macro name, optionally assign a shortcut key, optionally type a description. When the Macro Record dialog box disappears, your commands and keystrokes will be recorded as a macro.
Stop recording a macro	**T**ools•Stop **R**ecorder
Run a macro from keyboard	Type the shortcut key you assigned to the macro
Run a macro from the menu	**T**ools•**M**acro, select the macro, **<Enter>**
Edit a macro	**T**ools•**M**acro select the macro, **E**dit

FORMATTING SHORTCUTS

Single-space text	**<Ctrl>-1**
1.5-space text	**<Ctrl>-5**
Double-space text	**<Ctrl>-2**
Hanging-indent text	**<Ctrl>-T**
Normal style	**<Alt>-<Shift>-<NumPad 5>**
Double underline	**<Ctrl>-D**
Small capitals	**<Ctrl>-K**
All capitals	**<Ctrl>-A**
Subscript	**<Ctrl>-<Equal>**
Superscript	**<Ctrl>-<Shift>-<Equal>**
Remove formatting	**<Ctrl>-<Spacebar>**
Set margins	Format•Page Setup, type margin size, **<Enter>**
Set default font	Format•**C**haracter, select font and size, Use as **D**efault, **<Enter>**
Add border to paragraph	Format•**B**order, then select formatting options
Define styles	Format•Style, type or select style name, **D**efine, select options, Change

OUTLINING

When you go into outline view, the Ruler is replaced with the Outline Bar.

Go to outline view	**V**iew•**O**utline
Return to normal view	**V**iew•**N**ormal

Button	Task	Keyboard
←	Move heading down a level	**<Alt>-<Shift>-<Right>**
→	Move heading up a level	**<Alt>-<Shift>-<Left>**
↑	Move selection above previous heading	**<Alt>-<Shift>-<Up>**
↓	Move selection below next heading	**<Alt>-<Shift>-<Down>**
→»	Change heading to body text	**<Alt>-<Shift>-<NumPad 5>**
+	Expand text under heading	**<Alt>-<Shift>-<Equal>**
−	Collapse text under heading	**<Alt>-<Shift>-<Hyphen>**
1 ... 9	Display headings to level n	**<Alt>-<Shift>-**n
All	Toggle display of body text	**<Alt>-<Shift>-A**

Tip: Word provides default styles for nine outline levels. You can change these styles to apply the formatting you want.

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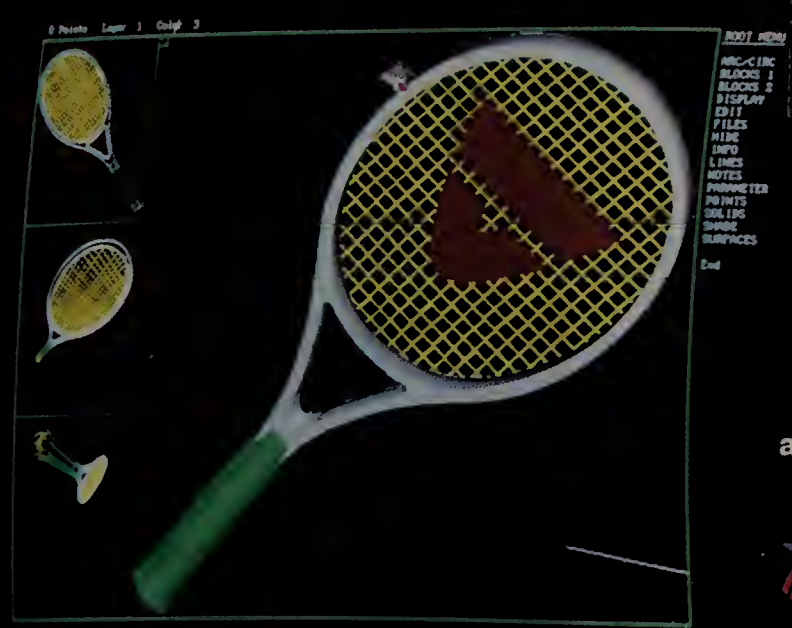

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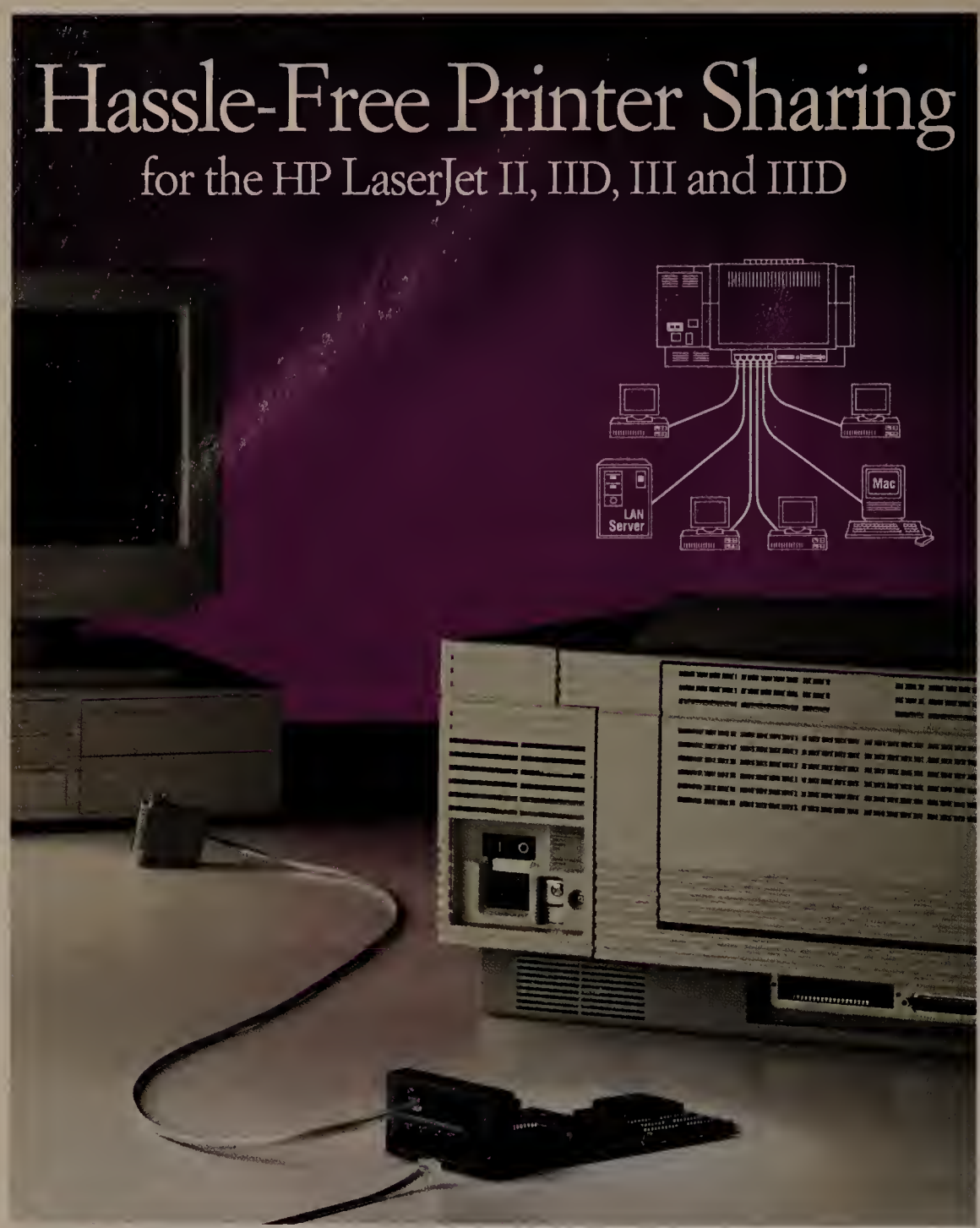

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Brett Glass is a contributing editor for PC World.

POWER TIP NO. 239

Changing a Trailing Space to a Leading Space With WordStar

When I want to move a word or phrase in *WordStar*, I begin the block at the start of the phrase and end it after the trailing space. Blocking this way is easier, as the <Ctrl>-A (jump one word back) and <Ctrl>-F (jump a word ahead) commands both place the cursor at the beginning of a word. When I'm placing the block in front of punctuation, however, I want to bring along the leading space instead. This shorthand macro quickly adds a space to the beginning of the block and deletes one from the end. Press **<Esc>?** and a letter, say **S** (if you're not already using it for another macro). Enter **Change trailing space to leading space** in the Description box, and press **<Ctrl>-P<Ctrl>-QB <Space><Ctrl>-P<Ctrl>-QK<Ctrl>-P<Ctrl>-S<Ctrl>-P<Ctrl>-G**. Then press **<Esc>S** whenever you want to switch a space from the end of a block to the beginning.

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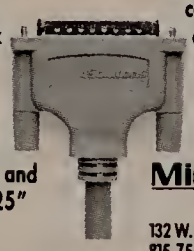

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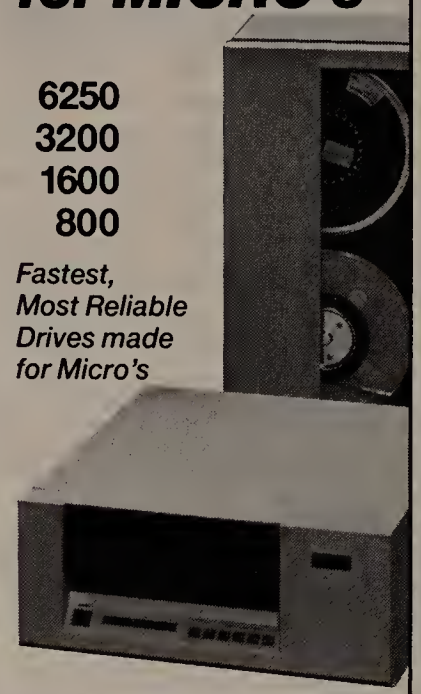

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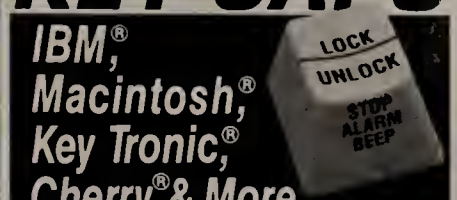

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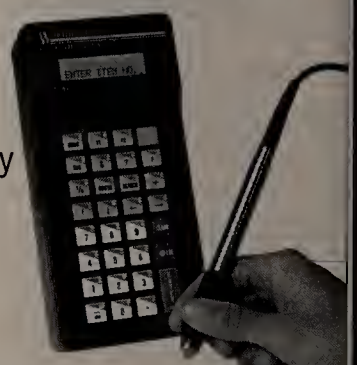

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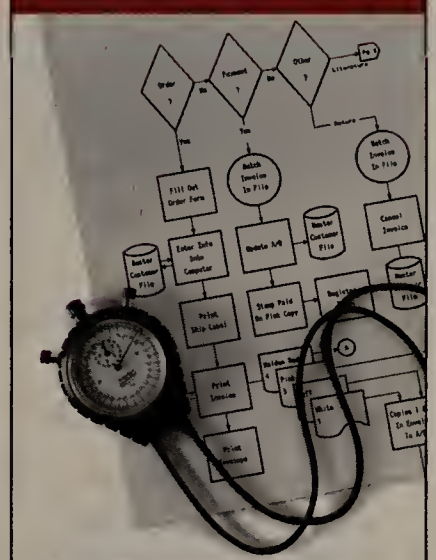

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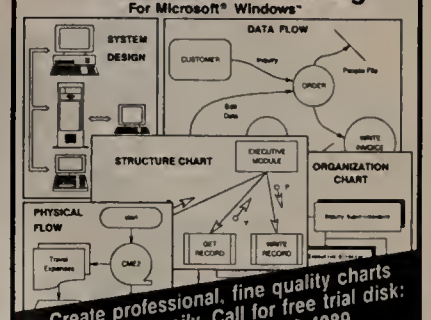

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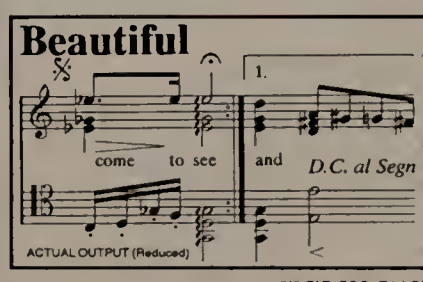

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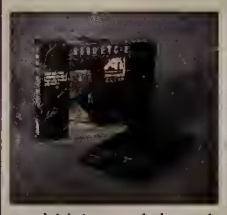

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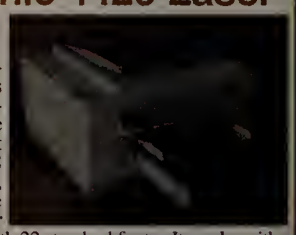

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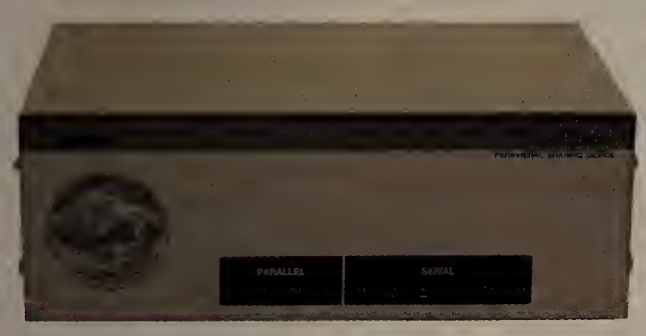

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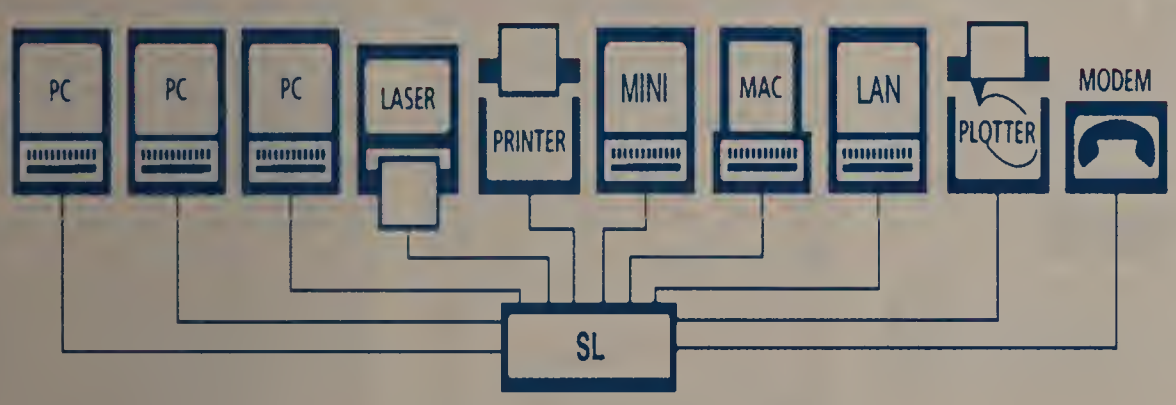

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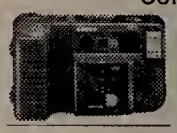

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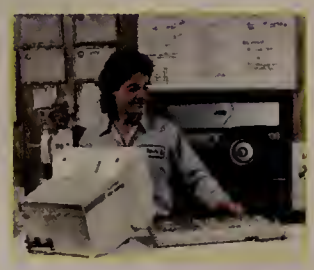

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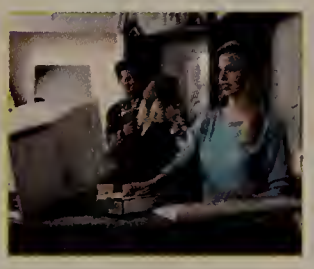

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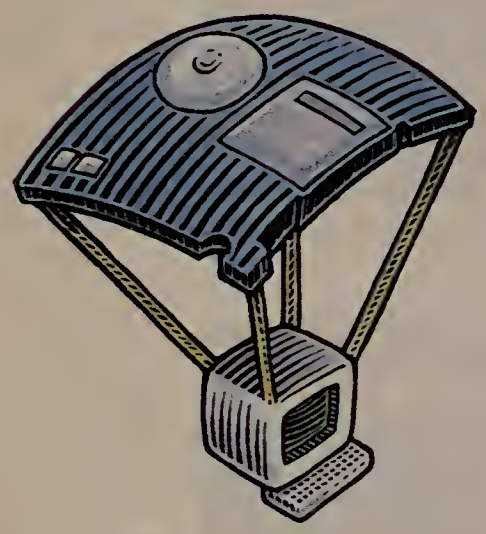

SCOTT SAWYER

There must be a little bungee-jumper in all of us. A friend of mine was doing something everyone tells you not to do. He ran CHKDSK/F from a DOS window in *Windows* and scrambled his hard disk's File Allocation Table. He hadn't backed up—ever—and not even *The Norton Utilities* could reconstruct his 40MB of data.

Not all of us are as gonzo as my friend. But even when it's not your fault, things go wrong. I've wiped out my share of subdirectories, but I've been lucky and have never crashed a hard disk. Maybe that's because I don't test fate: I back up daily.

I was surprised to find that many Pasadena IBM Users Group members don't. Some back up to floppies if they remember. But more than half the group members don't know that you don't have to back up the whole hard disk every time. Even using 1.2MB floppies, backing up an entire hard disk could mean shuffling disks 45 minutes or more a day.

If you're *still* using 1.2MB or, worse yet, 360K floppies, get a 1.44MB 3½-inch floppy drive for about $70 through mail order or at a swap meet and back up incrementally. It'll only take about an hour to install, and the world has moved to 3½-inch floppies anyway.

I use *Fastback Plus* to execute an *appended incremental* backup at the end of each day, usually in less than 5 minutes and rarely using more than three 1.44MB disks. I back up only newly changed files (the file's archive flag is reset to indicate it's been backed up) and fill the available space on the floppies. I perform a full backup of 185MB of data and programs once a month, which takes about 40 minutes. There are two advantages to my system: I spend less time backing up, and I'll *never* lose more than one day's work. If I ever have to restore, I start with the full backup and follow with each incremental. I stay organized and avoid errors when restoring or reusing disks by numbering and dating the disks and storage boxes.

Remember that backing up is just one part of good diskkeeping. Backups will go more quickly if you weed out duplicate and BAK files from your hard drive every week or so. I use the shareware program *DFL* to find and delete duplicate files before the full backup. Then, once a month, I comb through the disk with *Magellan,* erasing abandoned or underused programs and files.

You'll never forget to back up if you take advantage of your computer's ability to recognize the time and date. At the office, I've set *Fastback*'s scheduler to back up my workstation automatically at 11 p.m. I use a Bernoulli cartridge for both my backup and primary storage at the office, since I keep my monster 16MB DBF files there. No floppy swapping is necessary: My Bernoulli cartridges hold a minimum 90MB each. You could accomplish the same thing backing up to a tape drive.

At home where I change less data, *IfToday,* a small, free utility I keep in my AUTOEXEC.BAT, loads *Fastback* automatically on the last day of the month—as a not so subtle reminder that I'm due for a full backup. I do a full backup onto 1.44MB floppies monthly, or weekly if I've added lots of new programs. I'm so obsessive, I even make a second set to keep at the office in case of fire or earthquake.

Sure, I still take risks. I drive the freeways in L.A. and invest in stocks. But I keep my feet on the ground and my data backed up.

Contributing Editor Steve Bass is a family therapist and president of Pasadena IBM Users Group.

WHERE TO BUY

1.44MB floppy drive $69.95, Public software Library; 800/242-4775
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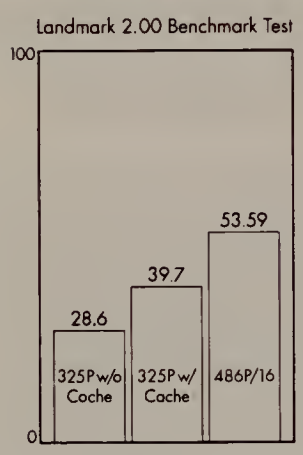

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